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SELECTED ECONOMIC TRANSLATIONS ON EASTERN EUROPE

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INTRODUCTION

This is a serial publication containing selected translations on all categories of economic subjects and on geography. This report contains translations on subjects listed in the table of contents below. The translations are arranged alphabetically by country.

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EAST GERMANY

Production at Karl Liebknecht Heavy Machine-Building Enterprise

[This is a translation of an article by Anton Kirberg in Fertigungstechnik und Betrieb, Vol IX, No 10, October 1959 Berlin, pages 595-604; CSO: 3183-N/a]

The development of the Karl Liebknecht Heavy Machine-Building Enterprise (SKL) into the second largest heavy machine-building enterprise of the German Democratic Republic is the result of the well-planned nnd thoughtfully guided development of superior constructions and large-scale installations of all types.

The production of the SKL today encompasses four totally different production varieties.

1. Four-stroke Diesel engines are mass-produced in different types with 3 to 8 cylinders and 75 to 1,000 horsepower. They are used for the most varied purposes, both mobile--for example, as driving motors for sea-going ships, and fixed--for example, as motors for boards, cranes, and dredgers or as Diesel generators and electrostations with a power of 50 to 350 kilowatts or 80 to 600 kilovolt-amperes. At the same tine they correspond to the high requirements of the shipbuilding classification companies.

Today the SKL Diesel engines are operating in almost every country of the world, giving good output, having an economical fuel consumption, and running in an absolutely reliable manner. Their construction corresponds to the highest level of technology and affords the best utilization of fuel combined with low horsepower weights.

The SKL today is the largest producer of Diesel engines in our republic and with its output stands in third place in Europe, this in spite of the fact that this production is still very young, the first engine--a four-cylinder engine with a 100 horsepower performance--having been built and tested in 1947. The first series, an achievement of the year 1948, encompassed 58 of these engines. The next larger type, with

a cylinder performance of 50 horsepower, was already being developed in 1948, and a few years later an engine of 90 horsepower per cylinder was developed.

After the successful beginning of the development and production of Diesel engines in 1948, the Soviet Military Administration in Germany decided to develop the Buckau Wolf Plant of the AMO Soviet Stock Company for Machine-Building into the largest Diesel engine plant. The extraordinarily rapid development of the Diesel construction can best be seen from the output curve.

Production rose from 90,000 horsepower (90 TPSe) in 1949--the year in which the GDR was founded--to about 500,000 horsepower in 1958. In 1959 the output will be about 550,000 horsepower, and the plant collective has committed itself to raise the Diesel engine production to over one million horsepower (1,000 TPSe) by 1965.

2. Boiler installations for 0.8 to 160 tons of steam production per hour are built for practically all cases where steam is needed. The design and production were taken up again in 1947, and today the production encompasses divided-chamber boilers, forced-circulation boilers, water-tube ship boilers, ship cylinder boilers, and above all high-performance radiation steam generators for highest performances.

The steam generators are equipped with superheaters and storage facilities for the feed-water. The semi-automatic or fully automatic furnaces are built for bituminous coal (Steainkohl), brown coal, and low-temperature coke as well as for liquid fuels. However, furnaces are also devised and produced for special fuels such as bagasse.

A special development is the two-cycle high-output steam generator--a small steam generator which is being built in a series of types for performances of 0.8 to 5 tons of steam per hour.

The steam generator installations are built almost exclusively as high-pressure installations and in most cases are used for the production of power, although also for the preparation of industrial steam. The development of production reached a volume of almost 18 million DM in 1959.

3. Equipment and installations for the chemical industry have been in development and construction since 1948. For

example, technical filters with a filter area of 0.3 to 90 square meters in the form of disk, plane, drum, inner, band-cell, capillary band, and cartridge filters are supplied to the most varied chemical industrial branches and also to the raw-materials industry. They are used in the potash, bituminous coal, brown coal, oil, food, power, dye, and ceramics industries, in chalk and lime works, in the treatment of ores, in bleaching installations, in the cellulose industry, and in many other industrial branches.

Boilers, autoclaves, chlorine and alkali towers, chlorine mixers, heat exchangers, scrubbers, rectification columns, crystallizers, etc. are produced in a great number of models for the most varied applications, which cannot possibly be enumerated or described within the framework of this article. They are made of the material most suited for the respective final use, often wholly of refined steels, often covered with these steels or nonmetallic materials such as plastics, rubber, etc. All products of the chemical apparatus section correspond in their construction and their composition to the most modern technology and are known throughout the world as outstanding products.

[4] Machines and installations for the food and delicacies (Genussmittel) industry are produced not only for the supply of our republic but also for direct and indirect export to almost all countries of the world. Machines and installations are built for the production of refined sugar of the highest quality, and complete plants are set up for the production of beet and cane sugar. Because of the development of new procedures and installations, which are protected for SKL by many patents, the work of the enterprise in the field of machines for the sugar industry is that of a leader--the machines and installations made by it have an excellent reputation throughout the world.

The development work of the SKL collective led to the installation of continuous and automatic work processes in sugar production.

Starting with the programmed washing of the beets, for which the individual aggregates work completely automatically, through the progressive and simultaneously occurring pre- and main separation and the CO_2 saturation with settling devices in connection with vacuum cell rotating filters, the work is of high quality and rational. SKL vacuum evaporating-cooking devices, programmed wholly automatic centrifuges, etc.

are leading products enjoying a world-wide reputation. The smallest installation for the manufacture of sugar cubes delivers 1,000 kilograms of sugar cubes per hour, packed in a hygienically perfect manner.

In 1947 the production of oil extracting installations was taken up by SKL as a new branch of production. Complete installations can now be built for the processing of 100 to 150 tons of oil seed per 24 hours. Oil can be extracted from all prepressed oil-containing fruits through processing with benzine. The extraction towers, distillation columns, dephlemators, benzine preheaters, steam generators and coolers, the devices for preheating and mixing the mixture, the expansion vessels, heating coils, filter presses, condensers, etc. which then become necessary are designed and built by SKL specialists. The technical development is continually pursued further, and today installations for continuous operation, supervised and controlled from a central directing stand through extensive measuring and regulating devices are being built.

The above listing gives only a very rough outline of the variety of the production of SKL according to its plan; however, it shows unmistakably the variety of the products and their importance for numerous branches of industry throughout the world. It must be added that the large number of special machines and aggregates additionally delivered to industries for which the main installations are supplied can hardly be listed.

It should not remain unmentioned, however, that in the past ten years the SKL collective again and again stepped in when help was needed in overcoming bottlenecks in other industrial branches in the building up of our worker and peasant state.

Thus, for example, after the freighter building process was undertaken by the people-owned wharfs in 1952, the SKL took over the production of steam power installations for the 3,000-ton freighters. The doubly connected piston steam engines with evaporation turbines for 2,450 horsepower performance needed for these freighters, together with the special steam generating installation also required with a 10-ton steam performance per hour, were designed, tested, and mass-produced.

After the end of the war, it was possible to supply power to small and medium industrial enterprises only by means of the "locomobiles" made by SKL. Until 1956 one and two cylinder

hot steam locomobiles in tandem as well as in compound versions with outputs up to 800 horsepower were being built.

Until 1955 the Buckau Plant Section, where large-scale installations for the industry of basic materials are made, belonged to SKL. That section designed and built large dredgers for the brown coal industry of the GDR, and paddle-wheel, digging, and advancing excavators were developed for export on the basis of Soviet designs. Casting machines and block roller frames for the steel industry, coke ejecters, working-up installations for peat briquette plants, and installations for cement plants were produced for the needs of the country and abroad.

In order to make possible the development of the design and construction of the most varied large-scale products in an even more concentrated and intensive fashion, the Buckau Plant Section was separated from the SKL on 31 December 1955 and was attached to the Georgi Dimitroff Plant.

Culminating in 1955 in the separation of the Buckau Plant Section, there had often been discussion and consideration of ways in which to clean up the production program in order to make it possible to concentrate on some definite installations for individual industries by cutting down the number of types produced. Some productions were to be transferred to other industrial enterprises in the republic, others were to be given up completely.

The world renown and the world-wide distribution which SKL products enjoy because of their high quality, however, made it impossible to give up parts of its production program. But, as a result of the specialization of the plant on the needs of definite branches of industry, it was also impossible to transfer the further development and production of these special products to other enterprises in the republic; not the least of the reasons for making this impossible was the fact that the SKL has a collective of specialists and scientists required for the development, design, and production of such different machines, equipment, and installations. In addition, the building up or respective reconstruction of the manufacturing-technological installations and equipment for these special productions had been voted for. This decision is a commitment for the whole collective of SKL to mobilize and use all its forces to develop the design as well as the production of all the products manufactured in such a way that trouble-free functioning as well as the most economical production with the

highest possible quality not only do not decrease but actually increase continuously. In addition, this development is to aim at continually raising the efficiency of the produced machines, equipment, and installations and at making possible a steady increase in the possibilities of applications and use.

Corresponding to the multiplicity of the products, the manner and number of production processes used are also unusually manifold. Almost all known working processes are used in the SKL. As the trouble-free functioning which may be expected of high quality products can only be forthcoming when the production techniques are developed accordingly, it is necessary that in addition to the research and construction being do to improve the quality of operations there should also be constant development in all fields of production technique in order to increase production quality, decrease production costs, and at the same time create the possibilities for a steady widening of the delivery volume and thus of the output in accordance with the requirements of the world market.

All phases of the production techniques of non-cutting shaping as well as machining with removal of chips, combination and separation techniques, thermic and surface treatments, and also but not last regulation, control, and measuring techniques are constantly to be observed and worked on with a view to finding possibilities for improvement. Of special significance in this respect is the choice and proper application of the production method best suited for the particular product. The diversity of the production does not permit the use of a unitary production process throughout the whole plant, and this results in the fact that partly the shop principle and partly the product principle are used or are prevalent in connection with the variety of products being manufactured according to the state plan.

Ince 1949 the greatest emphasis in production has increasingly been placed on the development and production of Diesel engines. The share of this production in the total plan is about 60 percent in 1959 and will be 77 percent in 1965.

The especially high requirements called for by this intensive production on the part of the workers in all shops and sections participating in the manufacturing show the direction of work for the technologists and enterprise engineers. As the production of Diesel engines from the plants own designs and development was newly taken up in 1948, all necessary manufac-

turing installations had to be decided on and procured. In addition, because of the available building capacity, it was necessary to take into consideration as far as possible the f fact that the production of several engine types could not be started simultaneously. The newly developed engines first had to be introduced on the world market, and at the beginning of the production it was not yet possible to give a clear prognosis of sales and thus the increase in the number of pieces from year to year could not be given. In any case, however, it was necessary to organize the kind of manufacturing that would lead from sample or individual-piece production to an economic series production. In 1947, using in part some very old machine tools, the sample production of the 100-horsepower 4 NVD 24 engine was carried out, and in 1948 the first series, consisting of 58 pieces, was produced. In 1948 also, however, the first sample of the next type, the 8 NVD 36 with a 400 horsepower performance, was manufactured.

The decision to build Diesel engines on a large scale at the SKL had been made and now had to be realized. The first result of this decision was that in 1949 it was already possible to deliver 190 NVD 24 and 105 NVD 36 engines to those who had ordered them.

The most important point of the production was the mechanical working, because all parts of the engine must be shaped by machine with removal of chips, and this means high requirements with regard to correct shape and measurements as well as quality of surface.

The available machines tools were overhauled, improved, modernized, and equipped with better drives; the operating characteristics were improved; and finally the machines were equipped with high-precision special installations and were thus converted to single-use machines. New machines were procured and installed in such a way that the transportation routes from working place to working place, especially in the working of large parts, would be as short as possible. The transition from shop manufacture to the product principle was started. Above average requirements were also set for the technologists and designers of enterprise equipment, and it is impossible to list all the work done by them as well as by the tool and equipment builders and the installation mechanics.

The value of the work and the level of production technique shall, however, be presented by means of a few examples which are typical of the problems posed and the solutions adopted.

The main part of the drive of a Diesel engine is the crankshaft, which in the case of large engines is made of a freehand-forged piece. Because of the free-shape forging the crankshaft can be preshaped only to a very slight extent, and a large amount of machining must be done, as about 70 percent of the rough material must be worked off mechanically. At first this work could only be done on the normal machine tools, as no special machines were to be had and the competent machine tool plants had not yet been built. The machines were subject to above normal requirements because of the heavy machining work, especially the unavoidable unterrupted cuts; the work was very concentrated with regard to its timing and thus uneconomical; the machines underwent a great deal of wear and tear and often broke down; and the result was constant interruptions of production and high costs.

A collective of capable enterprise equipment designers, partly together with designing collectives of other enterprises in the GDR, took over the task of developing and designing the special machines required for the working of large crankshafts. The greatest requirement was for machines to work the crankshaft of the NVD 36 engine and of the next larger type, the NVD 48, which in the meantime was also in production.

In a few years this collective designed several special machines which--as no data or prototypes were available--became sample designs for crankshaft-working machines. These machines were built partly in our enterprise and partly in cooperation with other enterprises in the GDR, and the first heavy rough-turning machine was put into operation in 1950. By 1952 there were more than 10 different special machines of the most modern kind for working heavy crankshafts.

Thus, for example, four different crankshaft rough-turning machines for the various working phases of preparing the rough forged pieces were made. The piece of metal to be machined is driven synchronously from both sides. The machines are equipped with several supports, the tools of which are in use simultaneously. An oval turning machine (Figure 1) was built for working the oval crank "cheeks" (Wanger); two "cheeks" can be worked on at once on the two supports. The double-sided drive for the workpiece and the drive of the swinging supports is guided synchronously by means of an electric beam.

The crank strokes (Kurbelhube) are milled with a special milling tool having an 800-millimeter diameter milling wheel and 48 inward pointing milling knives; the stroke pins

(Hubzapfen) of the crankcase are prepared for grinding with a stroke pin turning machine (Figure 2), and finally the stroke pins and pins for the intermediate bearings (Hub & Mittellagerzapfen) each receive their finishing grinding on a special grinding machine especially built for the purpose.

A special boring machine was developed and built for drilling the 450-millimeter deep oil grooves; the diagonal guiding of the drillings to this depth was especially difficult.

In all designs the newest technical insights of machine tool construction were considered and used--for example, multiple supports with several tool holders, transportation of the work piece and of chips, etc. Mention was already made of the use of mechanical or electrical synchronizing beams, required because the labile shape of the heavy work pieces necessitated two-sided drive.

This great development and designing of special machines was required because all crankshafts were being made exclusively of free-shape forged pieces. This manner of crankshaft production, however, not only uses a great deal of material and work but also has a very high incidence of rejects.

Another consequence of the high degree of machining and only slight shaping of the crankshaft, resulting from the characteristics of free-shape forging, is that faults in the material, such as segregation, shrinkholes, etc., which are usually in the interior of the block of raw material, can only be recognized after the mechanical working takes place. In addition, the course of the fiber is cut through and this interrupted in every crank pin through the milling-out of the crank stroke. Thus a crankshaft made of a free-shape-forged rough has, besides high material and labor costs, a high incidence of refects and is by no means of optimal quality. Roughs for small crankshafts such as for automobile engines are made almost exclusively as drop-forged pieces with considerably better quality and cost situations; however, the use of this forging process is not applicable with crankshafts of the size needed for the SKL Diesel engines. But some possibility had to be found of putting the crankshaft production on a more rational basis and improving the quality. Joint discussions with representatibes of the large forges of the GDR where the free-shape roughs are forged led to small improvements in the raw materials but were in no way satisfactory.

For this reason the SKL developed and introduced, first for the crankshafts of the NVD 24 engines, the bulldozer method (Stauchpressverfahren), which does away with the above deficiencies.

The crankshaft is forged exactly according to its shape, has only as much material left all around for machining as is required by the quality of the working and the tolerances of the bulldozing installations. In addition to a 75-percent saving on material, the working time is decreased by 30 percent. Not only is there a saving on wages and material, but the quality of the crankshaft has also been considerably improved as the grain is now absolutely in accordance with the shape, which gives the crankshaft a much greater stability of form, and above all the incidence of rejects brought about when freeshape roughs were used by entering the segregation zone has been eliminated (Figure 5). This method has proved itself for years in the manufacture of NVD 24 crankshafts and has brought about the saving of thousands of tons of steel and millions of DM.

In the SKL the crankshafts for the NVD 24 engine are bulldozed on a hydraulic. 1,000-ton flanging press. This press cznnot be used for making larger crankshafts, such as those for the NVD 36 and 48 engine types. Suitable presses which could be used in connection with the corresponding large installations for the bulldozing of the larger crankshafts are not available in the other large forges of the GDR either. A study showed that the bulldozing of crankshafts of this size requires a hydraulic press with a pressing forge of over 3,000 tons, which, in the placing of its columns and thus also in the execution of its upper and lower beams, would have to correspond to a press of approximately 5,000 to 6,000 tons to accommodate the large bulldozing device. Another possibility which was considered was the designing of a special press having horizontal and vertical pressing plungers working simultaneously.

It was found that the designing, building, and testing of such special presses would be very expensive and would also require a great deal of time.

For this reason a study was undertaken to find other possibilities of making the crankshaft production more rational while increasing stability of form as well as quality.

A few years ago a 4 NVD 24 crankshaft was produced by the gas butt-weldeing method (Abbrenn-Stumpfschweissverfahren);

since that time it has been operating without trouble in an enterprise power machine. In the regular inspections of the engine no damages were found on the crankshaft in spite of its having been operated under the most difficult conditions. For this reason it was decided to carry out experiments to result in a butt-welded 8 NVD 36 crankshaft. To carry out these experiments an electrical gas butt-welding machine type UMAK 100, allowing the butt-welding of cross sections up to 40,000 square millimeters is required. Since the SKL does not have such a machine, it requested the assistance of the VEB "Walter Ulbricht" Leuna Plant which does have a UMAK 100.

An engineer collective from the two plants worked together systematically on the suitable redesigning of the crankshaft, and on working out the technology for making the individual parts, carrying out the welding process, applying the thermic intermediate and after-treatment, and finishing the crankshaft.

In the first place, a testing plan was worked out providing that, in addition to the known physical and chemical tests on the materials, all possible testing and measuring methods were to be used in order to prove that a crankshaft made by the gas butt-welding process is not only as good but actually superior to one made by free-shape forging. This had to be proved so that the crankshafts would satisfy the high requirements of the shipbuilding classification societies and so that crankshafts built in this manner could be built into the main driving engines of ships. For this reason it was decided to carry out all tests being make on parts of the butt-weled crankshafts on a parallel basis also on a crankshaft of the same type which had been made of the free-shape forging method and had been accepted according to the regulations of the shipbuilding classification society.

The individual parts of the crankshaft were made in the SKL as sledge-drop forged parts (Schlaggesenkteile), and actually as stroke halves--i.e., "Z" pieces--because of the available forging aggregates. The sledge part consisted of a crank "cheek" with one half each intermediate and stroke pins. The forged parts were mechanically prepared for being put into the butt-welding machine and for the welding and were first welded into crank strokes (Kurbelhub). After a few experimental seldings which were tested chemically and physically, it was possible to determine the final welding characteristics. Several butt-welded crank strokes were

tested with respect to turning and bending vibrations, and it turned out that the butt-welded crankshaft parts were superior to the parts of the accepted free-shape forged crankshaft which had been tested under the same conditions. The tests were carried on forcible breaking of the test pieces, and it was seen that the break occurred much sooner, or under a smaller load, with the free-shape forged crankshaft than with the butt-welded one. Thus the superiority of the butt-welded crankshaft over the free-shape forged one was demonstrated and it only remained to bring proof of its good behavior in industrial operation even under the most difficult operating conditions.

The first butt-welded 8 NVD 36 crankshaft was carefully measured after the heat and mechanical treatments were completed, and its condition as to dimensions, shape, and surface was recorded.

The testing under operating conditions took place in an experimental engine on the experimental test stand of the SKL. In collaboration with the organs of the shipbuilding classification society, a test program was worked out which was then carried out under the continuous supervision of the classification society. In this program, which ran for hundreds of hours, the engine and thus also the crankshaft were subject to the most severe requirements. After the conclusion of the operating test, the crankshaft was takenoout and tested for changes in dimensions, shape, and surface condition. The results of the test showed no damage and not even any changes on the crankshaft. Proof had been obtained that a butt-welded 8 NVD 36 crankshaft stands up under even the most difficult operating conditions. The introduction of butt-welded crankshaft mass production will result not only in a saving of 2,682 kilograms of high quality crankshaft steel and 3,076 DM in costs for materials and labor for each crankshaft but also in a considerable improvement in the quality of the crankshafts because the structural rigidity of the crankshaft is improved through manufacturing the stroke pieces of drop-forged parts.

For the mass production of the crankshafts it is planned to drop-forge whole strokes on a suitable German counter-sledge hammer rather than the "Z"-pieces made for the experimental crankshaft. This reduces the number of butt-welding places by almost half and brings about a further reduction in costs (Figure 6).

The introduction of the butt-welding process in the manufacture of large crankshafts will save many thousands of tons of high quality steel a year, improve the quality and trouble-free performance of the Diesel engines, and contribute to a decisive lowering in the production costs for the engines. This example should show how the SKL works on the further development of manufacturing techniques.

The designing of special machines and special devices for non-cutting shaping as well as for shaping with chip removal, the modernization of universal machines and their conversion into single-purpose machines, the application of new manufacturing methods and the most modern testing methods are proof of the boldness with which the whole collective of the SKL tackles the tasks assigned to it. But they are also proof of the earnestness and sense of responsibility with which it approaches its tasks.

The example of the crankshafts shows how the socialist cooperation of the workers of not just an enterprise section but of several enterprises can result in the solution of difficult, sometimes seemingly insoluble problems, and it also shows something else:

Such complex problems cannot be solved with the drawing or calculating pencil alone; extensive preliminary tests must be carried out in the forge, the machining shop, and the testing laboratory; the results must be evaluated, and, with the workers of the respective enterprise sections, it must be decided how the necessary changes and improvements in the work process can be introduced and carried out. The solution of the problems is often decisively influenced by the collaboration of the practicing experts with their experience and exact knowledge of the working possibilities at just their particular working place.

The yearly increasing Diesel engine production required a careful organization of the work to be carried out. The construction of special machines and large installations made possible the installation of a product-oriented flowing production. The technologists worked out plans for the way in which the work was to proceed, setting down all the necessary instructions and preparatory drawings and also all work processes and steps, often even individual motions.

The working machines are chosen, as are the devices, tools, and measuring instruments to ve used. Thus, over the last

few years manufacturing routes or manufacturing "nests" were developed for the mechanical working of large Diesel engine parts, such as cylinder blocks, bed plates, crankshafts; intermediate parts, such as connecting rods, cylinder heads, swing wheels, exhaust collecting pipes; and small parts such as bushings, valve spindles, cams, cam bundles, piston bolts, cylinder screws, etc.

The assembly of the engines takes place on assembly-line carts in assembly routes which are set up separately for small and large engines.

Of the many special machines, a few may be mentioned:

Bushings for the driving mechanism of the Diesel engine are hurled out with white metal and finished on working machines, some of which are of our own construction (Figure 7). After their insertion into the bed plate of the Diesel engine, there follows extremely fine working for highest surface quality and exactness--an operation which used to be carried out only manually with a hand scraper.

Connecting rods are drilled vertically as well as horizontally with fine-drilling aggregates on a double-spindle fine-drilling installation (Figure 8).

Today dividing surfaces on bushings are worked on a special grinding machine which was developed and built at the SKL (Figure 9).

While today many individual parts are already manufactured on production routes equipped with enough machinery to take care of the presently required number of pieces, these are not yet the best possible as regards economy and output possibilities.

The number of engines to be manufactured in 1965 is to be twice as high as in 1959. The important factor is that the productivity in manufacturing is to be increased to such an extent that this task can be filled with the same or--even better--with a smaller number of workers. Thus the engine-building collective has been assigned a task which could hardly be larger and more extensive. The available production installations must be changed and expanded in such a way that a highly mechanized and as far as possible partially automated flowing production will result. While even now numerous single-purpose machines are being used, there are still many

normal universal machines in every production process. In addition, today the production flow is still being interrupted in order to carry out necessary thermic treatments in the enterprise sections equipped for this. The preparation of the roughs is also not yet always such that a considerable non-cutting preshaping can be done. Some examples of the above follow:

Bushings consist of a supporting steel cupped cover and a white-metal casting (Ausguss). So far the supporting cover has been made by burning out steel plate of a suitable thickness and then bending it into a cupped shape with a stamping press. In the mechanical preparation for the white metal casting which follows, difficulties then arise because of the irregularity of the dividing cut. The casting is done in the foundry; then the final preparation of the bushings for embedding is done in the machine shop. In the future, the roughs for the cupped supporting covers will be drop-sledged and thus to a great extent preshaped. For the further working, a complex route will be set up in which the covers will be worked on by aggregate or drum machines. An automatic centifugal casting will be incorporated into the route for the centrifugal expulsion of the covers and their subsequent finishing. The flow of production will no longer be interrupted. All work processes--exactly timed to each other--take place one after the other. The working machines used are mechanized to a great extent and combined into machine aggregates.

Materials and work pieces are transported from working place to working place on rollers or moving bands; the introduction into the machine and the removal of finished pieces of work are mechanized and self-activating.

At this time piston bolts are made of solid material (Vollmaterial). The surface hardness to be obtained requires the use of C 15 case-hardened steel. The bolts are worked almost exclusively on universal machines. The piston bolts must be taken from the machine shop to the hardening shop for case-hardening and other hardening, and then returned to the machine shop for finishing. The use of drawing sheaths made of CK 45 makes the installation of a complex manufacturing route possible. The rough piece is already supplied with holes and is to be milled simultaneously inside and outside on single-putpose machines and then to undergo inductive surface hardening in a high-frequency hardening installation to the machine shop.

In this and similar manners it is planned to set up flowing production routes for numerous individual parts, such as cams, cam bundles, valve spindles, drawing anchors, etc., but the intermediate and large parts must also be manufactured rationally. A complex route will be set up for cylinder heads. The production routes for cylinder blocks and bed plates will be rearranged and completed with highel rational machine tools, which will work in part as single-purpose machines. The special construction of double drilling installations and special large aggregates will combine several processes which now must follow one another in the manufacture of cylinder blocks and thus reduce the total working time. Working capacity will be created which will make possible a very significant increase in productivity through the use of the most modern techniques.

It was already stated that the emphasis in production lies on the mass production of Diesel engines. This production requires a large amount of machine shaping with removal of chips and thus the use of machine tools for the fine and finest working of the preshaped roughs or semifinished pieces and other materials, as well parts must be worked mechanically. High precision is required in the production of the individual parts and in the assembly because of the requirements with regard to quality of execution and operation for the finished engine.

In addition, a large-scale interchangeability must be guaranteed, a condition imposed by mass production.

Of a completely different type are the installations required for the production of steam generators, chemical apparatuses, machinery for the food industry, etc. The main elements of the installation are kettles, containers, pipe systems, etc., and also large cast pieces such as filtering drums and running and flange rings.

Steam generators, chemical apparatus, sugar manufacturing machines, and oil extraction installations are always individual installations, and the design and construction are always determined in accordance with the respective requirements and operating conditions of the place that will use them. With steam generators, the hourly steam output, the saturated or hot steam production, the pressure and temperature conditions, the feedwater, and above all the manner of construction are essential characteristics of design and execution.

The various steam generating installations are equipped with the most suitqble kinds of firing installations according to the type and quality of fuel used. The multiplicity and variety of the apparatus and containers made in the field of chemical apparatus construction require for each order a careful examination on the part of the designer of the requirements of the installation to be constructed. In addition, the various metallic and nonmetallic materials used or required in the building of the chemical apparatus must be determined.

The equipping of a sugar factory requires numerous different pieces of apparatus and machines which must be made to accord with the output required by the factory and the available raw materials, as well as with the product requested.

Oil extraction installations can also only rarely be made alike in their individual installations and aggregates.

From all the above it follows that the equipment and machines being produced at the SKL in addition to Diesel engines are individual projects in each case, and must always be fully functional and of optimal efficiency and rationality in the sample execution.

But it also follows from this that the manufacture of these installations and their individual parts can hardly be set up in such a way that, with the small number of pieces and the variety of components, a flowing production or assembly will result. A product-oriented grouping of the working machines is also not possible because the construction of steam generating installations as well as that of chemical apparatuses and installations for the food industry requires not only kettle and container work but also pipe-bending work and machining.

For this reason at SKL these produtss are made in shops which are set up in such a way that the largest possible amount of working can be done on aggregate to be finished. Two large kettle forges are equipped with all machines and installation required for the shaping and working of sheet metals and similar materials. In addition to the non-cutting shaping, combination and separation processes must also be used; shell ring containers and their parts must be worked mechanically. In both kettle forges, heavy plate is mostly used. For the working of fine plate metals there is a

metal plate forge, and the machine tools for the working of large parts such as filter drums, axles, shafts, etc., and the manufacture of small parts are grouped together in two machine shops. The combining process which used to be most frequently used in the construciion of kettles and containers--riveting--has been replaced at the SKL for quite a while already by electric arc welding.

SKL was the first enterprise in the GDR to carry out the process testing of UP-welding on kettles and containers subject to inspection and to receive the authorization for using this highly rational atuomatic electric welding method in the manufacture of high-pressure kettles and containers (Figure 10).

Great difficulties were presented by the rational execution of extensive pipe bending. Many thousands of bends and curves must be made on pipes of all dimensions and of the most varied wall thicknesses. Suitable machines were not available; manual bending requires a great deal of time and is inaccurate besides. Therefore, two types of pipe-bending machines were designed and built at the SKL, one for pipes to 150 millimeters in diameter and greatest radius of curvature of 1,000 millimeters, the other for pipes with diameters to 60 millimeters and radius of curvature to 300 millimeters (Figure 11). Many kettle constructing enterprises in the GDR have copied this tested design and are using it rationally. The weldings for which the requirements are great must ensure the highest security; nondestructive testing is done by means of supersonic sound and X-ray installations.

At this time the use of radioactive isotopes is being introduced for the thorough testing of even the thickest walls. That, in addition to the normal kettle sheet metals, the austenitic and plated ones used in the making of chemical apparatuses must also be welded perfectly need only be mentioned for the sake of completeness. It goes without saying that a large number of special installations for all working processes and also for assembling the aggregates must be designed and built. Thus, for example, a winding installation was built for the manufacture of special heat exchangers which permits the making of double plate metal coils 40 meters long, one meter wide, and with a coil distance of 10 millimeters.

Pipes for recrystallizers with a diameter of 76 millimeters, and a length of 10 meters had to be ground inside from end to end. A special grinding machine was built for this unusual work. In the production of filter rollers, chilled casting coatings of 800 millimeters in diameter and 8 meters in length had to be shrunk on core shafts, etc.

The development of the SKL to one of the largest heavy machine-building enterprises would have been impossible if the plant had had only machine shops and kettle building and assembly facilities. Such a development is only possible when sufficient well-functioning rationally operating and efficient hear shaping and reshaping facilities are included in the production process.

Most gray iron parts used in the products are cast in our own foundry. In this work the parts for Diesel engines, such as cylinder blocks, bed plates, cylinder heads, and also filtering drums are especially susceptible to imperfection because of their complexity, thin walls, and large dimensions.

These parts are only reluctantly taken over for casting from other foundries, and the SKL was forced, if it wanted to fulfill and expand its production plans, to utilize all means and mobilize all forces in the manufacture of high-grade castings of even quality. The SKL was successful--through a correct utilization and division of the shaping surfaces for small, medium, and large casting--in obtaining the highest achievable output of gray cast pieces with the smallest possible incidence of waste. The most modern jar-ramming and jar-squeezing turnover drawing machines are used in just the same self-understood way as the electric dryers for floor forms (Bodenformtrockner) for large shapes. The best shaping and casting processes are used, not only to shape quickly and cleanly but also so that the whole shaping and casting process will proceed as rationally as possible. The CO_2 water glass and the cement-sand shaping process--to name only a few of the most often mentioned modern shaping processes--are used in addition to the proven sand and clay shaping processes. Synthetic resin binders are added to keep the drying times short. Rising gate pouring and ingot mold casting raise the quality and output when used on suitable pieces. The shaping and core making are mechanized to a large extent. In addition to the shaping machines of various sizes, quite a number of time-saving and labor-saving devices were built and installed. Further work on the improvement of the foundry foresees the putting into operation of sand

slingers and core-shooting and blasting machines, as well as the installation of a mechanical line for the shaping, pouring, cooling, and emptying of the machines. The preliminary working of the sand is to be improved and mechanized, as is the conveying of the sand to the shaping places. The sand is to be returned from the emptying places mechanically.

At this time the cast pieces are still cleaned dry with steel shot blasting and automatic cleaners. In order to rationalize this operation, and above all to eliminate the danger of silicosis, highly efficient wet cleaning installations will be installed which will reduce the cleaning time by 60 to 80 percent while preventing any dust formation and will return the cleaned shaping sand for re-use. These installations work with recirculating water and thus are very thrifty in their operation.

However, not only grey cast iron pieces are produced, but also parts made of nonferrous metals, required in the building of the various pieces of equipment.

All parts made of copper and aluminum bronze, light metal, white metal, etc. are manufactured by centrifugal casting and tipping casting under the most rational shaping and pouring conditions.

The numerous patterns required are made and maintained in a modernly equipped pattern shop. For cast pieces which are shaped and poured in large numbers and which therefore entail a high degree of wear on the pattern, either reinforced or all-metal patterns are made.

The large forge of the SKL is used for making the large number of free-shaped and drop-forged parts required in construction. In addition, many thousands of tons of forged pieces are made each year for other enterprises in the GDR. Hammers and presses of various sizes up to 20 mt counter sledge hammer (20 mt-Gegenschlaghammer) and the 1,000-ton flanging press are available. The forged pieces are heated in oil-heated or gas-heated kilns which are adjacent to the respective hammering or pressing aggregates. Here also, rational warm-shaping methods are used. The cooperation of the flanging forge in the introduction of new work methods was already illustrated in detail by the example of the crankshafts. The more rational and qualitatively improved manufacturing of crankshafts would not be possible in the NVD 24 engine without the bulldozer process, not in the NVD 36 engine without the manufacturing of large drop-forged parts.

One further example among many:

Entry, exit, and starting valve spindles for Diesel engines are required in large numbers and must be made of high-quality heat-resistant steel. The roughs are drop-forged. After the introduction of the electric upset method with subsequent finishing forging in a warm state, it was possible to achieve considerable savings in time and materials, Cam holders, which in the past could only be made of solid material, could also be made with high savings of materials and costs by the bulldozer method after this procedure had been tested.

When we keep reporting special installations, equipment, and tools, which more often than not are exceptional machines, we must mention--besides the many-sided designers of machinery materials--the machinery materials building section with its highly skilled specialized workers. Without this shop for building equipment and tools, the SKL collective would not have been in a position to undertake the enormous increase in production of recent years. Equipment and apparatuses of all kinds and degrees of precision are made and tested in this section. And even the many cutting tools which are needed in the various shops cannot always be had on time or in sufficient number from the tool factories and are then made in our own machinery materials building section. In particular, the SKL itself makes all special tools which have been tested and developed for its production process.

The care of the cutting tools, the sharpening and regrinding of dulled tools takes place in central grinding installations under the supervision of "tool masters." These central grinding installations are located in the machine shops. Their installations and a corresponding organization bring about the most accurate maintenance of the geometry of the tools' cutting edge, so that the tools can fulfill the cutting requirements set by the chipping technologists, which in addition guarantee the best operating time.

An engineer collective of research technologists has the task of studying, testing, and introducing all working methods which seem suitable for the production of the SKL. It has at its disposal a small experimental shop in which machining tests can be carried out. This collective examines and evaluated systematically the numerous suggestiond and hints for the improvement of machining techniques which might be of use for the production of SKL. Above all, the many suggestions

for the improvement of work coming from the collective of the SKL are worked on for further use. All research work is discussed in collaboration with the production shops. Section leaders and masters are acquainted with the new working methods, and above all these are made familiar to the man on the work bench. He has confidence in the work of the research technologist because he knows and has come to appreciate his work.

The development and utilization of new tools or working methods are explained and motivated to the administration collective and the skilled workers in the field through illustrated lectures. Examples from the shops are shown, and in the discussions that follow advantages and disadvantages are weighed together, and often practical demonstrations of the tools discussed follow in either the experimental shop or the production sections.

To date, over 100 special tools for particular machining conditions and difficult working processes have been developed and introduced into the production process. Each one of these tools has improved the working process and the quality, raised the efficiency, and above all led to a reduction in costs.

In the new bezirk directives and the many technical meetings in the GDR, the insights and experiences obtained at the SKL are passed on to wide circles of the industry and to the institutes of our high schools.

As an example, let us cite the use of cutting ceramics as material for tool-cutting edges. In cooperation with the producing plant, and making use of research results published in the domestic and foreign technical literature, extensive series of tests were carried out, with the result that the borings of cylinder bushings for the NVD 24 and 36 engines are now finished for honing with only cutting ceramic C 40 rather than with hard-metal G 1 or H 1 as before. With hard metal it was only possible to preturn and finish turning in two cuts following each other and having respective cutting times of $v = 40$ and 90 meters per minute. The production time was $t_{Gm} = 10$ minutes for NVD and 25.7 minutes for NVD 36. With cutting ceramic C 40 it was possible to raise the cutting speed to $v = 400$ meters per minute. The designing of a special tool permitted the use of three cutting edges simultaneously, and the boring is finished for honing in one operation. The milling imte is not only $t_{Gm} = 2.1$ minutes for NVD 24 and 4.2 minutes for NVD 36.

The reduction of the milling time to 20 percent of 16 percent respectively allows the milling of many times more cylinder bushings on the same number of machines.

This example in particular shows very clearly the value of technological research.

Through the introduction of new technological processes and the testing and adoption of efficient tools, productivity is increased decisively, the output is raised without putting into operation additional machines, and thus socialist reconstruction is progressing.

The development of the SKL into the second largest heavy machine-building enterprise of the GDR would also not have been possible if the whole collective had not cooperated on this development with tenacity and persistence. Ways and possibilities are found in common through discussions, suggestions, and every year many thousands of suggestions for improvement bring millions of DM for the enterprise and thus for the people's economy. In many socialist worker collectives and Soboliev brigades, problems of safeguarding production, fulfilling the plan, and also socialist organization of work and of enterprise reconstruction are solved cooperatively by the workers, the designers, the technologists, and the economists, and the measures worked out are put into practice cooperatively.

An accounting of achievements to date is given in regular scientific and economic conferences; successes and difficulties are shown clearly and unequivocally. Criticism is severe and passionate, and the way to fruitful further work and development is found and adopted together. The tasks set for the SKL in the coming years require the full energy of the collective and the intelligent active collaboration of each member of the enterprise. By 1965, the production volume is to be raised 80 percent, with 77 percent of this production to be in 75 to 1,000 horsepower Diesel engines. But installations for the chemical industry and the building up and development of atomic power plants also constitute an essential part of SKL's manufacturing program. It is planned to carry out reconstruction measures resulting in the creation of the necessary productive capacity. Large parts will be manufactured in complex production routes; the transportation of materials and work pieces will be mechanized and partially automated; and the work processes will be partially automated and be done on aggregate machines.

The designing of the numerous special machines required was begun in the Special Machine Designing Bureau of the SKL as well as in the designing bureaus of various machine tool factories and institutes.

Some shops will be completely re-equipped in order to bring together working machines which belong together and thus shorten transportation routes.

The normalization and standardization of many similar parts and building groups will facilitate stock-keeping and lower the cost of production.

Numerous proposals for the improvement of the work flow have already been submitted from all enterprise sections and are being utilized in carrying out truly socialist reconstruction.

Socialist worker associations were formed in all shops for the reconstruction of the shop or of a particular production sector. Workers, foremen, section leaders, technologists, and designers work tirelessly and together on this task.

Photo Captions

Figure 1. Oval Turning Machine for Crankshafts

Figure 2. Machine for Turning Stroke Pins

Figure 5. Macro-grinding of a Bulldozed Crankshaft

Figure 6. (Upper) Rough of a Butt-Welded Crankshaft, Weight 1,618 Kilograms
(Lower) Rough of the Same Crankshaft, Free-Shape Forged, Weight 4,300 Kilograms

Figure 7. Fine-Drilling Installation for the Bushing Case of the Engine

Figure 8. Aggregate Machine for the Fine Drilling of Connecting Rods

Figure 9. Grinding Machine for Dividing Surfaces on Bushings

Figure 10. UP-Welding Stand for Shell Rings to 5,000 Millimeter Diameter and 8,000 Millimeter Length

Figure 11. Pipe-Bending Machine

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EAST GERMANY

Reconstruction at Rostock Diesel Engine Plant

[This is a translation of an article by Guenther Albrecht and Hans Goslich in Fertigungstechnik und Betrieb, Vol IX, No 10, October 1959, Berlin, pages 605-609; CSO: 3183-N/b

1. Basic Problems of Reconstruction

In order to show foreign countries the superiority of the socialist people's economy, our industrial production, which by 1965 is supposed to be almost double what it was in 1957, will have to be increased considerably. Since this task must be accomplished with the presently available labor force, a corresponding increase in labor productivity is required. The prerequisites for this are a rapid development of the productive forces, an increased application of technical-scientific progress, and a perfecting of socialist production conditions.

These tasks, which were cited as the principal economic tasks by the Fifth Party Congress of the United Socialist Party of Germany, cannot, however, be solved on the basis of the capitalist splitting up of production. This contradictory state of affairs must be overcome first and a rational organization of production must be developed. A rational organization of production under socialist production conditions, however, can only be a socialist concentration, specialization, and cooperation in production. The changes in the people's economy and in individual enterprises brought about for this purpose constitute socialist reconstruction and require a renewed and thorough consideration of the manner of production. Under socialist conditions of production, this means new and thorough consideration of the manner of production on the part of those holding political and economic power.

In the DMR [Dieselmotorenwerk, Rostock; Rostock Diesel Engine Plant] work has been going on in eight work groups since the beginning of March 1959 on the individual problems. Eighty-three production conferences with about 1,500 participants and two technical conferences with about 180 participants

have resulted so far in 540 suggestions for improvements amounting to a profit of about 4.5 million DM.

One hundred suggestions for improvement aim at obtaining a rational organization of production through concentration, specialization, and cooperation. In all cases this requires a technological reshaping of the enterprise. Some changes in this respect were planned in the DMR.

2. The Development of the Rostock Diesel Engine Plant

The DMR was founded in May 1949 and through the years developed into the largest Diesel engine plant in the GDR next to the VEB Karl Liebknecht Plant in Magdeburg. Until 1956, the production program encompassed Diesel engines with performance of up to 1,200 horsepower. During 1956 to 1959 the plant was enlarged for the building of large Diesel engines. Since, however, no engines of this size had yet been developed in the GDR, in 1958 the building of the MAN types K6Z57/80 and K7Z80/120 with a cylinder performance to 870 horsepower under licensing agreements was begun. The production area was considerably enlarged through a three-naved hall containing machines for large-scale working, assembly, and testing stands as well as through a welding hall.

While the production program first started in 1949 with the building of the 4 DV 224 four-cylinder engine under licensing agreements with the SKL, it grew steadily through our own developments. If we consider the year 1959, for example, the following production variations are planned:

Motor	Variation
4 DV 224	28
3 NVD 26	15
4 NVD 26	10
6 NVD 26	22
6 KVD 43	1
8 NZD 72	1
K 6 Z 57/80	2
K 7 Z 70/120	1

This review alone shows that a rational organization of production had become very difficult. In this connection let us only point to the complicated and nonrational work of the "materials procurement" and "technological manufacturing preparations" sections and of the accounting departments, etc. not

even mentioning the problems of the direction and administration of production, stock-keeping, etc.

These considerations alone show that it was absolutely necessary for the DMR to undertake some changes.

In addition, there is the fact that the large docks in Warnemunde and Wismar need a constantly greater number of large Diesel engines in order to fulfill the shipbuilding program required by the Seven-Year Plan. Figure 1 shows how production will develop in the DMR up to 1965.

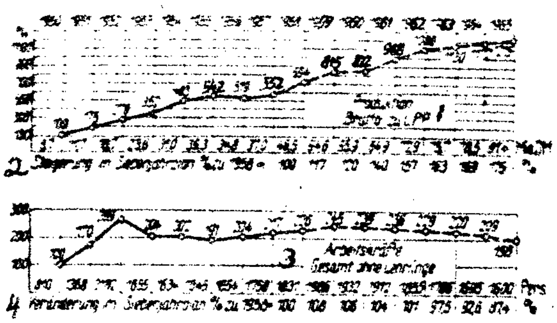


Figure 1. Development of Production and Labor Forces to 1965

1) Production, gross to UPP [?]
2) Increase in the Seven-Year Plan, percent of 1958
3) Total labor force, without apprentices
4) Changes in the Seven-Year Plan, percent of 1958

As can be seen from the figure, this task must be accomplished without an increase in the labor force; in fact, the labor force will actually decrease. The key to the successful solution of the economic problems is thus an increase in labor productivity, as shown in Figure 2.

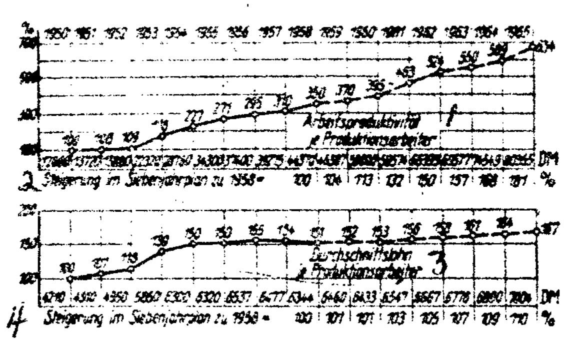


Figure 2. Development of Labor Productivity and Average Wages to 1965

1) Productivity per production worker
2) Increase in the Seven-Year Plan, percent of 1958
3) Average wage per production worker
4) Increase in the Seven-Year Plan, percent of 1958

As already mentioned, however, this increase in labor productivity cannot be achieved on the basis of a production level which still rests on the capitalist splitting up of production. This is why socialist reconstruction became an objective necessity not only in the DMR but in the whole industry.

3. Planning of Reconstruction Measures

The main task of all reconstruction measures must thus be the elimination of the capitalist splitting up of production. This is a complex task which can be solved not in an isolated manner by the individual enterprises but only in cooperation with the VVB and the industrial branch.

For the Diesel engine sector, all measures were coordinated through the work group formed. In accordance with a vote of the Diesel engine industrial branch of the VVB Diesel Eingines, Pumps, and Condesers, the tasks of the enterprises manufacturing engines in the republic are now clearly separated. Starting in 1961, accordingly, the DMR will only manufacture two-stroke Diesel engines of the types NZD 48, NZD 72, KZ 57/80, and KZ 70/120.

Thus the main task of the reconstruction was solved and a concentration of production as well as a specialization of the enterprises was achieved, creating a considerable prerequisite for the increase in labor productivity without a significant outlay of investments.

This cleaning up of the production programs is of course only the first step in a development of concentration and specialization which must aim to manufacture individual engine parts or individual aggregates in one enterprise, which will then supply the needs of the whole GDR or of other socialist countries. Such engine parts might be pistons, piston bolts, connecting rods, bearings, cylinder bushings, valve spindles, cylinder heads, bushings, and gears.

This specialization in the sense of true economy can only be a matter for the VVB or the industrial ministry. This development must first begin with centralization within an industrial branch.

Within the framework of socialist reconstruction, it was agreed in the VVB Diesel Engines, Pumps, and Condensers between the SKL and the DMR that the cylinder heads for the NVD 26 and DV 224 engines would be manufactured centrally in Rostock.

Within the framework of this contribution, the manufacture of cylinder heads is considered as an example of reconstruction. The reconstruction of the manufacturing process in the

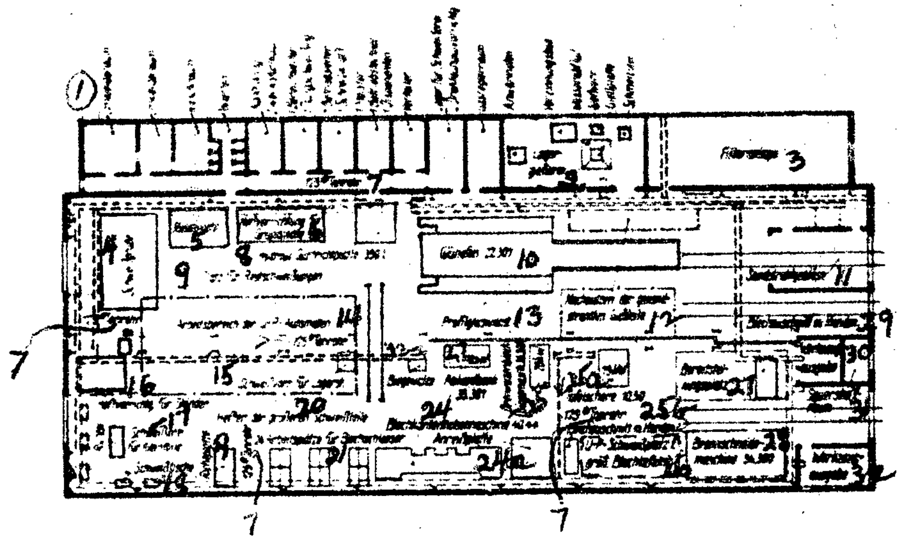


Figure 3. Welding Hall (Old Condition)

1) [upper section, left to right] Dressing room; dressing room; lavatory; toilets; 1 control and 2 purchasing; 1 section manager and 1 apprentice; 1 office supervisor and 1 clerk; 1 master and 1 technologist and 1 worker; distribution; storage room for welding hall and wire-winding installation; gas regulation room; preheating furnace; tin plating bath; water drain; casting device; casting plate; melting furnace.
2) Stock foundry
3) Filter installation
4) Welding pit
5) Preparation plate
6) Lifting device for ground plate
7) 125 Ø clay pipe
8) Hydraulic belt preparation plate
9) Space for leftover weldings
10) Annealing furnace 22,301
11) Sandblasting device
12) Repolishing of sandblasted cast pieces
13) Glass wall
14) Work area for UP automats
15) Welding installation for stock parts
16) Lifting device for stands
17) Welding of small parts
18) Welding tables
19) Preparation plate
20) Lifting of larger welded parts
21) Work benches for plate fitters
22) Bending roller
23) Beveling bench
24) Machine for smoothing plate bends 4044
24a) Plate for breaking up
25) Plate bending machine with three rollers 36300
25a) Table shears 1050
25b) Plate cutting with hand tools
26) UP welding area for larger tin plates
27) Area for readying work
28) Torch cutting machine 34,300
29) Plate cutting with hand tools
30) Tool dispensing; 31) Oxygen room; 32) Tool dispensing

welding hall will be presented as an example from the field of the manufacture of large engines.

4. Examples

4.1 Reconstruction of the Welding Hall

The welding hall (Figure 3) was built in the course of the plant expansion and was originally designed for a yearly production of 90 cylinder units. However, the construction change of an engine type from cast-iron stand to welding, which resulted in a lowering of theengine weight, brought about an increased requirement for welding work. Thus it is now possible to produce welded parts such as bed plates (Grundwannen), stands, and frame center parts as well as "small parts" such as ducts for scavenging air, galleries, etc., which vary according to the types of motors produced, for only 60 cylinder units annually.

At present, the manufacturing follows the shop principle. The numerous welded parts on a relatively small production area led to a very tight space situation, increased the danger of accidents, made for long and complicated transportation routes, and caused considerable waiting periods.

Thus economic production did not result. To this must be added that the cylinder output must be raised to 120 cylinder units per year in accordance with the long-range plan. Therefore, the reconstruction of the welding hall was unavoidable.

In order to rationalize the production of the welded parts, an attempt was made during the first considerations to change from the shop principle to flowing production. In this way it was planned to simplify to a great extent the complicated transportation routes. It was found that this would only be possible if the present hall were used only for making large parts, rather than for both large and small parts as at present It was planned to move the production of small parts, which takes up about 500 square meters of production area, to the present apprentice shop--mechanic shop--and to allot a corresponding hall to the latter in Plant II.

Transportation routes and technological flow are closely correlated, however, with the technological flow being the decisive factor. Therefore, it was necessary to work over the available technology in order to do justice to a flowing pro-

duction method. It was now possible to determine the minimum production area necessary to fulfill the program in accordance with the long-range plan.

These determinations revealed the situation as shown in Figure 4 for 1959. In order to do justice to the planned production increase, this area should be expanded as shown in Variation 1, Figure 4. Variation 2 (see Figure 5) is the result of including the production of small parts in the welding hall. Finally, Variation 3 is an extremely modern variation. All three variations, however, show that not only a complete reorganization of the whole production process but also an expansion of the hall or the building of a new hall would have been required.

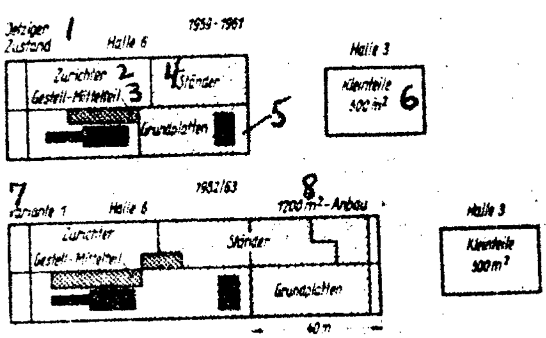


Figure 4. Spatial Division of the Welding Hall (Present Condition and Variation 1).

1) Present condition
2) Preparation
3) Frame center part
4) Stand
5) Bed plates
6) Small parts, 500 m^2
7) Variation 1
8) 1,200 m^2 addition to the building

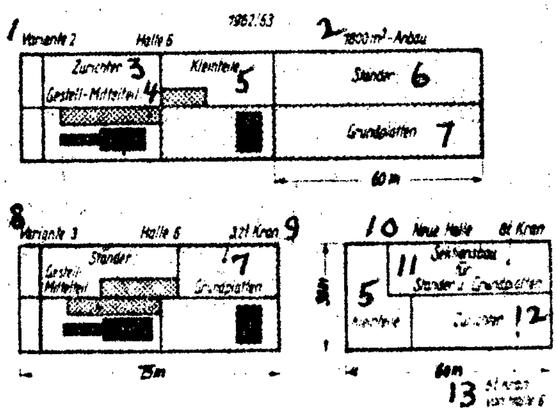


Figure 5. Spatial Division of the Welding Hall (Variations 2 and 3).

1) Variation 1
2) 1,800 m^2 addition to the building
3) Preparation
4) Frame center part
5) Small parts
6) Stand
7) Bed plates
8) Variation 3
9) 3.2-ton crane
10) New hall
11) Sectional construction for stands and bed plates
12) Preparation
13) 5-ton crane from Hall 6

Modernization of enterprises through investments, however, is only one of the ways in which reconstruction may be carried out. As it is not possible to carry out an instantaneous modernization in all enterprises during this Seven-Year Plan even if the amount of investments was raised considerably, this means could be adopted by only a few especially important enterprises. For this reason, most enterprises must set their sights according to the second means of reconstruction: "introduction of rational technological procedures, making use of the available machines and equipment."

By making use of the cooperation relations, it was possible to assign the welding of the stands for both types of engines to other enterprises. But cooperation must simultaneously be specialization, and for this reason an effort was made to place both types of stands in the same enterprise. This enterprise is the VEB Meerane Steam Boiler Plant (VEB Dampfkesselbau Meerane).

Thus only the production of bed plates and frame center parts remains in the DMR. As the bed plates are of decisive importance here, they were decisive in the new arrangement of the working areas. The decisive factors were the new technological flow, the labor forces available, the crane capacity in both naves of the hall, the welding pit, and the fixed UP welding portals.

The new work course now looks as follows:

0 Storage area for bed plate parts
1 Storage and construction area of the sections for bearing seats (Lagerstuehle), front walls, and frame center parts
2 Building plates for the sections for outer walls, inner walls, upper and lower belts
2 UP welding portals for the sections for bearing seats, frontal walls, outer and inner walls
4 Welding portal for the sections for frame center parts
5 Assembly for the bed frames sections
6 Assembly for the frame center parts sections
7 Building plates for the building of the remaining parts (floor plate, etc.) onto the bed plate, for control, measuring, and X-ray
8 Welding pit for bed plate and frame center part
9 Place for putting finished welded parts before annealing
10 Annealing furnace

To simplify the job of bringing about an economical arrangement, a ground plan of the hall and scale models of the individual parts, sections, and finished pieces were used. Taking into consideration the shortest possible transportation routes for work pieces and workers, it will be possible to arrange a rational flowing production of welded parts.

The expenses required are about 115,000 DM for the acquisition of 14 building plates and for moving the small parts manufacturing and the apprentice shop. On the basis of the more rational production, it will be possible to save about 33,700 hours within two years, amounting to [a value of] about 138,000 DM. Thus it was reasonable to apply for a rationalization credit, which in the meantime has been approved. The first measures were started with the aim of beginning the more rational flowing production in the beginning of October.

4.2 Reconstruction of the Production of Cylinder Heads

The shape of the cylinder head for the NVD 26 engine can be seen in Figure 6 [photo]. The cylinder head of the DV 224 engine differs only in that the socket of the cooling water outlet is missing and a recess is screwed on the valve side. At present about 5,000 cylinder heads for the NVD 26 and 4 DV engines are produced yearly in the DMR, which means that about 16 cylinder heads must be turned out every day.

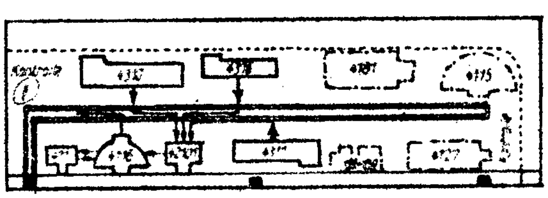


Figure 7. Machine Plan of the Cylinder Head Route (Present Condition)

1) Control

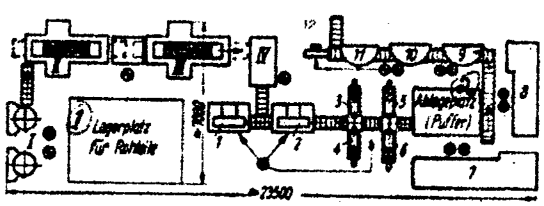
Figure 7 shows the setup of the machine tools for the production of cylinder heads. The mechanical operations are carried out as follows:

a) press		
b) turning on	DIZ 630 x 3600	(4310)
	DIZ 630 x 3600	(4311)
	DIZ 630 x 2800	(4316)
c) press		
d) milling on	FW 3000 x 1200	(42101)
e) drilling on	BR 45	(4116)
f) drilling on	BS 12	(411)
g) screw-cutting on	FR 45	(4116)
h) press		

The machine tools used are all universal machines, since so far no high number of pieces has been requested. In order to deliver the yearly 5,000 pieces, the machines must run for two shifts and one drilling machine must run for three shifts. This means that 11 work crews are required daily.

According to the reconstruction plan, the number of pieces will rise to 20,000 yearly. Thus the daily output must increase to 70 pieces. Production with universal machines running on three shifts would mean that 45 work crews are required daily. However, since these workers are not available, recourse must be had again to mechanization--i.e., to the introduction of a flow cycle.

Two variations of flowing production were worked out in the DMR. For the first variation the technology was worked out in such a way that as many of the available machine tools as possible will be used. The machine tools are to be modernized and equipped with suitable devices so that the required productivity will be obtained.



1) Storage for component parts
2) Depot (pistons)

Figure 8. Production Route for NVD 26 and DV 224 Cylinder Heads (Variation 1).

To the flow cycle shown in Figure 8, the following should be added:

Drilling is done on two available carrousel drilling machines (I). The cylinder heads travel on a moving belt (Rollbahn) to the two double-spindle milling machines (II and III), which are more economical than the single-spindle milling machine 41101 shown in Figure 8. After the press (IV), the cylinders go to the multiple-spindle drilling machines (1 and 2) and the drilling units (3 to 6) on which the drillings are made. They then pass through the turning machines (7 and 8) to the radial drilling machines (9 to 11) for drilling and screw-cutting, and after the radial turning operations (12) they leave the flow cycle.

A comparison of the production times given with this variation as against the present method of production shows a reduction of 258 minutes in the time required per cylinder head for the NVD 26 and 203 minutes for the DV 224.

The mechanical working requires 12 work crews per day for the NVD 26 and results in a 312-percent increase in labor productivity. For the DV 224, 13 work crews per day are required; the increase in labor productivity is 225 percent. The cost of acquiring new machines, transportation facilities, tools, and installations amounts to 340,000 DM.

The second technology worked out foresees mostly special drilling units after the "pressing off" operations, as shown in Figure 9. As compared to the first variation, these machines carry out the drilling and depressing operations instead of the multiple-spindle drilling machines and turning machines, and partially the screw-cutting operations of the radial drilling machines. The radial drilling machine 11 of Figure 8 remains in use for the cutting of the larger windings.

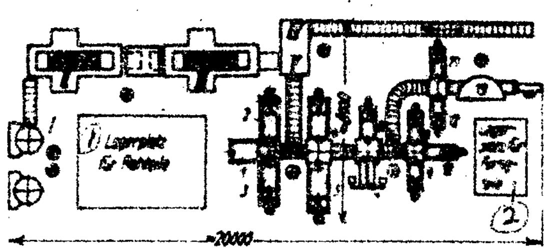


Figure 9. Production Route for NVD 26 and DV 224 Cylinder Heads (Variation 2).

1) Storage for component parts
2) Storage for finished parts

The piece being worked on is transported from station to station in a work holder and returns on the upper rolling belt after the last operation has been finished.

This type of flow cycle as compared to the present production with universal machines gives a reduction of 295 minutes in the production time for the NVD 26 and 240 minutes for the DV 224. This results in a labor productivity increase of 655 percent for the NVD 26 engine and 458 percent for the DV 224 engine. The labor required is six work crews per day for the production of the NVD 225 cylinder head and seven work crews per day for the DV 224. The cost of machines and installations is 700,000 DM.

On the basis of the studies carried out so far, the DMR has decided in favor of Variation 2. The decisive factors were the greater saving of time per cylinder head and thus the greater increase in labor productivity, the smaller number of work crews required, the greater production reserve, and the more modern character of the flow cycle.

However, these reflections alone must not be allowed to be decisive in choosing one or another variation of flowing

production. The most important technical-economic index, which decides the suitability and profit factor of flowing production, must be the index of production cost. To determine this exactly in the DMR, it will not be enough to compare the outlay of time and labor, as was done so far. In the DMR this leads to the determination of production costs by the bookkeeping method. In this method the general costs, which form a significant part of the production costs, are calculated as being proportional to the loan. This method is absolutely unsuitable for the determination of economical production for different technological variations.

In order to judge technological processes, it is necessary to split up the costs according to their origin in production. If the structure of the production cost is considered according to its origin, two factors must be distinguished:

a) costs which depend on the number of pieces (proportional costs)
b) costs which are independent of the number of pieces

It would be beyond the scope of this article to show and explain the formulas used in such calculations. These may be found in the literature cited.

Within the scope of this article it was only possible to discuss two examples. With these, however, reconstruction in the DMR is not completed but rather has only entered the first phase of a long-term development.

Photo Caption

Figure 6. The NVD 26 cylinder head

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Problems of Standardization in Agricultural Machinery and Tractor Construction

[This is a translation of an article (from the works of the Institute of Agricultural Machinery and Tractor Construction--Dr. Engr R. Foltin, Director) by Engr K. Dietrich, published in Deutsche Agrartechnik, Fol IX, No 9, September 1959, Berlin, pages 389-391; CSO: 3278-N/a]

At the Fifth Party Meeting of the Socialist Unity Party of Germany, it was requested that the pace of standardization be considerably accelerated, to create favorable conditions for the specialization, mechanization, and automation of production.

The Sixth LPG Conference specified these objectives for the construction of agricultural machinery and tractors, and criticized the lack of standardization, for which state organs are responsible. Standardization is especially important at the present period, as agricultural machinery will now be handed over to the LPG's and must therefore be better in quality and lower in price. Agricultural machinery should be devised so as to universally serve for various kinds of campaigns, especially by means of interchangeable tools.

Similar single parts must be sued for the various capacity classes. Thus amortization will be quicker, purchase prices lower, spare part assortments smaller, and as a consequence of smaller assortments less working capital will be tied down. Moreover, standardization will have to be the means of increased production of agricultural machines and tractors, with only slightly increased manufacturying capacity. Standardization means increased piece output of single parts and elements; specialization and mechanization of production open new sources of accumulation.

The Various Forms of Standardization, and Future Objectives

Methods of standardizing agricultural machinery and tractor construction are as follows:

Working and Establishment of Types

The establishment of types includes the clarification of the production program by selecting the best machines of those produced at present and the elimination of types no longer suitable. Parallel production of similar machines is also to be avoided. As this kind of standardization deals with already existing constructions, this work is described as "retrograde" standardization, as opposed to "progressive" standardization, which means the unification of future machinery construction.

Progressive standardization--i.e., unification of global production--is to be achieved in connection with those types of agricultural machines and tractors that will be selected as type standards. These standards will, as a matter of principle, contain technical and economic requirements which will also apply to research pertaining to new machinery, and to machinery development.

While former purely technical type norms applied mostly to principal measurements and connection sizes only, the new type standards will, above all, contain technical and economic data, such as degree of efficiency, weight per unit of power, test conditions, and packing conditions. Thus the type standard will be a general instruction for the development of new products. (See TGL 4149 Bruising Mills; Standardization, page 2,1781, November 1957.)

The working out and establishment of types for the products of agricultural machinery and tractor construction are interdependent, as the starting point is the now-existing optimum of a machine actually produced, and further perfecting in the coming years is requested to meet the established standard. Types are not worked out as a final form; this is a continuous process, based chiefly on the fact that improved agricultural machinery and tractors will be introduced into production, while obsolete constructions should be eliminated. For this purpose, a so-called Type Plan for agricultural

machinery and tractors has been worked out which specifies certain machine types to be eliminated and new machinery to be introduced by 1965. The Type Plan and type standards form an inseparable unit. To work out type standards, it is definitely necessary to be informed about machinery which will have to be replaced by better models within the next few years and also to know the technical and economic achievements needed to attain and surpass world standards. To estimate world standards, designation codes should also be used. For tractors, for example, these are: weight per unit of power, fuel consumption, and attachment hook power. These codes should be incorporated in type standards (for tractors, for example) and be considered as requirements.

Reduction of Material and Restriction of Single Part Assortment

The reduction of material types and qualities used for the construction of products is very important as regards storage and procuring of these materials. It is therefore a considerable achievement that 40 steel types only are now used according to the LaN assortment, out of the 542 appearing on the standard list, and 10 kinds of cast material out of 18.

Material reduction and restrictions in single part assortments make it possible to interchange materials for various designs executed in the same plants, and also within the same industry in cases where interruptions in material supply might hinder rhythmic production continuity. Besides, where much larger quantities are needed, the materials can be purchased from rolling mills direct.

In working out programs based on material reduction, light metal designs should especially be stressed, using light-metal profiles where these can replace heavy profile steels.

The elaboration of the reduced supply program will be made in cooperation with the VVB Norm Parts; the standardization program worked out by the VVB will primarily be taken into consideration, and, if possible, be even more restricted as regards agricultural machinery; a further selection should also be made to achieve optimal standardization.

The savings which can be achieved by material reductions are shown by the revision of construction designs, ready for

execution, of a cable traction aggregate. These designs have been revised by a socialist work group, whose members were colleagues of the VEB Weimar Harvester-Thresher Works and the VEB Schoenebeck Tractor Works.

1. Reduction by 51 of the material assortment range.
2. Switching over from solid material (Vollmaterial) and steel castings to wrought rings, from solid material to drawn casings (Ziehhuellen), from solid castings to hollow castings; use of flat bar steel and band steel instead of sheet metal (elimination of cutting).
3. Savings of about 30 percent of welding time and electrodes, by restricting welding seams at unimportant spots, and by introducing "Unterpulverschweissung" [flux welding?].
4. Savings by switching over from case hardening to induction hardening.
5. Replacing manufacturing methods producing shavings by fully shaving-free methods (for example: chain manufacture free of shavings).
6. Adapting sizes to the international range of the socialist countries (thus reducing gauge assortments).
7. Standardization (self-executed reshaping of a lubricant pump into a standard pump; utilization of the combine seat).
8. Total savings in a set of cable traction aggregates of 20,000 DM--i.e., 600,000 DM in 1960 and, in terms of manufacturing figures by 1965, 12.8 million DM.

The Standardization of Single Parts

[Single-part standardization] decisively helps to reduce single part lots. This makes it possible to increase the operational possibilities of agricultural machinery and tractors and to simplify storage. The unification of single-part manufacturing, comparisons of single-part technologies, and the centralization of production in one plant, if possible, mean considerable economic profit.

Before standardization was introduced, four different kinds of mowing bars (Maehbalken) were used in our harvester fingers (Maehfinger). After standardization, only two kinds remain. In order to reduce the spare part assortment, already existing machines will also have to be reset with standardized fingers. An automatic machine belt conveyor is being devised for fingers, which is to save 450,00 DM yearly.

The unification of single-part types is especially interesting from the view point of the Kovaljov Research on finding the best technological processes in the production, maintenance, and eventually reconditioning of spare parts. The uniform execution of a standard part also calls for a unified optimal method.

The differences new existing in production are demonstrated by the following example.

Manufacture of single-groove V-belt pulleys from steel plate in various plants:

Plant	Diameter (millimeters)	Width (millimeters)	Production Cost (DM)	Selling Price (DM)
Neustadt	179	20	4.32	4.95
Weimar	180	17	4.99	6.95

Concerning this matter, it is absolutely necessary to transmit the best working methods and working systems to the plants producing standardized parts, by exchanging technical experiences so as to achieve an optimal technological process.

Besides the standardization of single parts, the utilization of existing parts in new constructions is also important for further rational maintenance and production. For this reason, the standardization of single parts is definitely promoted by taking over as many single parts from old constructions as possible, not from similar machines only but also from machinery coming from other plants. Thus, not only duplicated parts of the present field chaff-cutter E 065 should be used for the reconstruction of the large size field chaff-cutter, but it is also essential to discover which of the automotive combine's single parts could be taken over for this purpose.

In order to enable all machine builders to extensively utilize existing parts, an information service for duplicate parts by the ILT [not identified] is urgently needed. The BBG [not identified] and "Fortschritt" [Progress] are showing initiative in this respect. These plants have worked out extensive material for information purposes and have made it available for plants dealing with agricultural machinery construction. Both plants have listed (with design and spare

part numbers) spur gears, bevel gears, chain wheels, cone belt and flat belt pulleys, oscillating disks, etc.

Standardization of Construction Units

The necessity of the universal use of agricultural machinery and tractors and the realization of machines easily kept in repair calls for the unit construction system. This system furthers the close specialization and cooperation of production, lowers development costs of agricultural machinery and tractors, and makes possible the specialization of the special workshops of machine tractor stations, as well as the introduction of the conveyor belt system for maintenance jobs.

Agricultural machinery and tractors built according to the unit construction system can be adapted for various agricultural purposes by simply exchanging variation units without having to multiply the number of types.

An excellent example of the unit construction system is the development of RS 09 tractor in its variants. This tractor of the 16- and 18-horsepower class can be used as tool carrier for field work, as a plantation tractor for fruit and vegetable culture, as a hop tractor, as well as for yard and stable jobs.

The following degree of standardization has been attained in the construction of the RS 09 variants.

Use of Standardized Parts (in percent)		Identical Parts in the Variants (in percent)	
RS 27	90	RS 27	67
RS 28	90	RS 28	67
RS 54	99	RS 54	98
RS 56	93	RS 56	71

The combination series for drill machines manufactured in Bernburg[1] is the best example of standardization in agricultural machinery construction.

Objectives Up to 1965

The agricultural machine and tractor industry has worked out an inclusive program of unit construction:

Soil Tilling Tools: First of all, the various construction groups with identical functions in the combination series of plows are to be reduced.

Fertilizing, Sowing, and Cultivating: The combination series of drill machines, connected with a combination series for manure distributors and multi-purpose appliances (yet to be constructed) is to be coordinated as regards wheels, driving gear, and traction gear of drill machines and manure distributors. Tool rails, lifting devices, drill blade levers, and hoe levers should also be produced in uniform finishes. The combination system for manure distributors has to be ensured variants of three-point attachments, tractor attachments, and front attachments.

Harvesters: The principal construction units of harvesters are presses, chaff aggregates, threshing aggregates, and binders, which have to be worked out as complex standardized groups. Concerning, for instance, straw presses (divided into low-pressure and high-pressure presses), the possibility of using all construction units as fixed presses, attached presses, cleaning presses, and collecting presses must be guaranteed. Chaff aggregates should be repeated as unified construction units in fixed chaff machines, as well as in field chaff machinery of similar finish. Both the large-size field chaff machine and the harvester-thresher should be fitted with channels 1,200 millimeters wide in order to make possible the use of similar shafts, bearings, and driving gears, wherever this can be done. Threshing drums and chaff drums have to be constructed along new lines.

Root Crop Harvesters: It should be endeavored to achieve uniform types in all rooting appliances, shares, filter chains, conveyors, traction gears, etc. Full capacity potato and beet diggers should be standardized as far as permissible by agricultural technical processes. By 1961 all filter chains of the full potato and turnip diggers should be supplied in qualities better resisting wear.

Machinery for Yard Jobs: Standardized construction units, first of all fodder-cutting machines, have to be constructed on the basis of type series. Standard construction units should enable designers to considerably reduce project work connected with the designing of central fodder containers. Such a project standard is demonstrated in the WV 344 whalebone milking stand for stable and pasture use (Elfa-Elsterwerda).

Tractors: In tractors the unit construction system should be chiefly applied in the 30-horsepower to 60-horsepower classes. A good beginning in the standardization of the construction units of the 30-horsepower class can be found in the Nordhausen Tractor Works. By making use of the unit construction system, the RS 14/30 type has now been developed to make possible its execution as 28-, 36-, and 45-horsepower tractors, 90 percent of the construction units being similar. In the construction of the 60-horsepower class, all-wheel tractor with attachments, the unit construction system should als be applied, making use as far as possible of already existing elements of old construction units, such as engines, gears, etc., thus achieving a minimum of preparatory work and avoiding a considerable increase of spare part listings.

Standardization of Means of Production

Fifty to 80 percent of the total time spent on the technical preparation of a new item's production is taken up by the building and manufacture of the necessary means of production. Therefore, standardization in this is also of great importance. The use of ready-made standard parts and the application of universal tools, such as the quick-acting clamping drill device DIN 6348 and similar devices, will definitely reduce preparatory work. It should also be pointed out that typified technological processes also considerably influence the standardization of tools and devices.

The standardization of tools and devices for agricultural machinery and tractor construction is, however, not enough; devices and tools used for maintenance must also be standardized. Therefore, the industry should also work out an adequate program for the standardization of the maintenance of the tools and devices attached to agricultural machinery and tractors.

Close Cooperation Needed Between Industry and Agriculture

The realization of the standardization program by 1965 calls, however, for the cooperation of agriculture and industry. Standardization of agricultural machinery and tractor construction and standardization of agriculture are interdependent.

A primary request of industry is that specifications of agricultural technology be laid down in standards worked out on the basis of the machinery systems. Such specifications are, for example, working widths of 1.25, 2.5 and 5 meters and their multiples, or the space between potato and sugar-beet rows, or--to introduce the unit construction system in yard jobs--the standardization of fodder variants.

To introduce the unit construction system in cereal harvester production, the output of the harvester-thresher and chaff-cutter must be standardized; also, mechanical standardization is not possible without standardization of the optimal harvesting method. The same applies to the harvest of root crops.

Good work has already been done in this field, and it should now be generalized on a large scale. Such a standard has been worked out for plowing, which, together with plow type standards (to be evolved), encompasses the entire complex of this method of soil-tilling.

Specifications concerning standardized row spacing in fruit and vegetable cultivation (taking into consideration the actual working widths of agricultural machinery and tractors) were made known by the "Mechanization of Horticulture" Special Committee at the Standardization Conference; they show that standardization in agriculture is well on the way.

The most important agricultural and industrial objectives should now be coordinated; the determination of the specifications of agricultural technology and industrial standards will have to be the subject of complex tasks.

The observance of the specifications of agricultural standards and of the standards of agricultural machinery and tractors must be globally controlled. Standards for testing agricultural machinery and tractors should also be worked out. Many standards of this kind already exist in other countries, for example: GOST 7057: Agricultural Tractors, Methods of

Field Testing; GOST 2911: Plows for General Use, Jethods of Field Testing.

The Potsdam Bornim Institute of Agricultural Technology, as a state testing authority, should work out these standards of test regulations for agricultural machinery. Such standards should, in the future, be the basis on which agricultural machinery and tractors are taken over. Standardized test regulations should also be observed in field tests taking place in the producing plant.

The Important Task of the KDT

Socialist community work will be absolutely necessary for the further introduction of standardization in industry and agriculture. Complex tasks therefore call for socialist work cooperatives. Plant divisions and special committees of the Chamber of Technology [KDT] will play important parts in this respect.

On 16 and 17 June 1959, a Standardization Conference was held under the leadership of the Special Committee on Agricultural Machinery and Tractor Construction in the FV [not identified] "Agricultural and Forestry Technology" of the KDT, together with the Ministry of Agriculture and Forestry. This conference worked out the general lines of standardization in agricultural technology and instructed plant divisions and other special committees on the best methods of quicly and effectively activating socialist cooperatives in the field of standardization. The VVB Agricultural Machinery and Tractor Construction and the industry's plants organized standardization committees, which will, under the leadership of the technical managers of the leading plants, take up and work out the complex objectives of standardization as state authorities.

The members of standardization committees must be workers, engineers, and scientists in industrial and agricultural fields, as well as tractor drivers and cooperative farmers, in order to obtain the best results. The standardization of agricultural machinery and tractors will then not be restricted to the competence of standardization engineers but will become a large-scale movement, well able to utilize all possibilities of socialist production methods.

If it can be actively and speedily realized, the program of agricultural machinery and tractor standardization will efficiently help to fulfill the chief economic objective.

Footnote

[1]See Vol 4 (1959), page 194; and Vol 6 (1959), page 254.

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The Fundamental Significance of Standardization in Agricultural Machinery

[This is a translation of a report given by O. Bostelmann, Head of the Mechanization and Construction Division in the Ministry of Agriculture and Forestry, Berlin, at the Second Work Conference, "Standardization in Agricultural Machinery and Tractor Building" (VVB/KDT) on 16 June 1959, held at the Markkleeberg Exhibition. Published in Deutsche Agrartechnik, Vol IX, No 9, September 1959, Berlin, pages 392-292; CSO 3278-N/b]

According to the objectives set by the Seven-Year Plan for agriculture, large quantities of agricultural machines and tractors should be given to agriculture. By 1965, machinery equipment will include the following important items;

110,000 tractors
14,000 harvester-threshers
7,000 harvester-chaffers
10,000 full-capacity potato diggers
4 full-capacity beet diggers

This successful development of mechanization, connected with the socialist transformation of agriculture, would, however, not be fully utilized without the rational introduction of modern technology in the socialist enterprises. Improvements of modern technology in the socialist enterprises. Improvements are needed in this field, and the Central Committee of the Socialist Unity Party of Germany (SED) therefore again requested in its Fifth Plenum the introduction of progressive technology, of new scientific achievements, and--last but not least--the acceleration of typification and standardization. These viewpoints refer to all agricultural branches and therefore also to agricultural machinery and tractor construction.

The Requirements of Agriculture

[These requirements] were made known by the reports of the Fifth Plenum and by Wlater Ulbricht's communications on the occasion of the Sixth LPG Conference concerning standardization problems.

1. The production of tractors, agricultural machinery, and tools has to be reduced to a small number of types which are suitable for all conditions and circumstances of agriculture.

2. The use of standards and the interchangeability of construction units in agricultural machinery and tractor building should be better organized and systematically introduced.

3. The standardization of single parts, a basic necessity for the fulfillment of the requirements listed in items 1 and 2, should be pursued with the goal of substantially decreasing the spare part and material entries in agricultural technology.

4. Standardized outlets and standardized measurements of connections created for all tractors and their accessory machinery and implements.

These foremost requirements of agriculture addressed to the agricultural machinery and tractor industry are based on the fact that modern production methods and progressive technology definitely require highly efficient machinery equipment, as well as rapid repairs and the interchangeability of important construction elements. It is also necessary to decrease repair costs and to simplify the supply and storage of spare parts. By surveying the present situation in the field of standardization of agricultural technology, we shall have to state and criticize the fact that this situation in no way answers the demands of the Sixth LPG Conference and the Fifth Plenum. Here are some examples.

Typification

More than 80 difference types of trailers are now used in agriculture. It is unnecessary to point out what this means for progressive working methods--for example, during the silo corn harvest, where the interchangeability of superstructures

is eminently important. Many other examples can be cited as regards yard work, especially conveyor installations, manure cranes, and electric motors. Up to now, no series of standardized tractor motor types has yet been devised, in spite of agricultural circles' constant requests. This is, for instance, shown by the fact that the KS 30 chain tractor, the E 173 and E 175 harvester-threshers and the RTA 511 core tractor have three different motors, although all are listed with the same motor power value--i.e., 60 horsepower. Typification in this single case would make it possible to produce about 30,000 motors per series, and to save installations for two further assembly lines with all necessary equipment the tools. Productivity could thus be substantially increased; considerable price reductions would also be possible, which would be in accordance with the demands made by the Sixth LPG Conference and the Fifth Plenum. The feasability of such typification has been demonstrated by the VEB Agricultural Machinery Works in Bernburg and the VEB Tractor Works in Schoenebeck, where it has been shown on drill machines and tractors that important economic advantages can be achieved if machine building is based on the principle of using uniform construction units for all variants required for agricultural purposes.

Use of Standardized Construction Units or Standards

This problem has been definitely underestimated. Thus, for example, four different full-capacity potato diggers have been developed and produced these last years in this country, which also have four different screening and conveying chains. How does this work in a machine and tractor station which may have yhree E 372 and three E 672 machines and will soon be getting another type, the E 675? It is necessary to store this two or threefold quantity of chains to get through the campaign. At the lowest, about 7,000 DM are immobilized for chains, which prevents the storing of other important spare parts.

The same applies to the pick-up rolls of the cleaning and collecting presses and the pick-up device of the harvester-thresher. The problem of tractor and machine tires is still more urgent; many kinds of tires cannot be interchanged, although there are no objective technical reasons for this state of affairs. The manifold types of conveyor and transfer lines

are also hindering the work of our MTS's, VEG's, and LPG's, and this without any good reason. The principle of unit construction would be the most logical method in this field.

Constant construction changes are also serious obstacles, as they do away with any kind of standardization. A typical example is the RS 14/30, where twelve different authorized models (Zustandsformen) evolved out of four basic motor types.

Standardization

A decisive prerequisite for the use of types and of standardized construction groups and standards is the systematic standardization of single parts. Here too, large-scale arrears can be found in agricultural machinery and tractor construction. Striking examples are the M 4795 harvester-loaders and MH 374 harvester-chaffers, the M 4798 and MH 280 crank disks and the M 4708 and M 1000A hubs (Naben) of the above-mentioned machines, etc. This applies to other constructions, as well as to the drive shafts of harvesters, to bearing casings of full-capacity potato harvesters, to pinions, hydraulic installations, chains, screws, etc. These examples taken from a few MTS's show the nonsense of but also the reason for our inflated spare-part stocks and all the results of this inflation, as seen in deliveries, storage, and supplies, It cannot be said that this helps the reconstruction of maintenance in agriculture. This is where standardization objectives have to be closely connected with the necessary measures.

The constantly increasing machinery stock of MTS's, LPG's, and VEG's specifically calls for the standardization of various outlets and sizes, such as the bolt diameter of "Ackerschienen" [ridgers?], the "Zopfwellenanschluesse" [shaft joint outlets?], etc., in the interior equipment of sockets and plugs. The standardization of these single parts has been definitely neglected, although this considerably increases the size of assortments, disturbs finance plans, endangers deadlines, and makes it impossible to stock sufficient quantities of currently needed spare parts.

These examples demonstrate that organized standardization does not yet exist in agriculture. In view of the important tasks in this field, it is definitely necessary to radically improve this situation; therefore, the elaboration of a con-

crete program in the near future cannot be postponed any longer. This program must promote a considerable boost of standardization in agriculture in order to achieve still better economic results.

What Measures Are Necessary?

Standardization activities in agriculture must step out of their narrow compass and the limits of specialized competence. Here too, the Fifth Plenum's statement is valid--i.e., that it is, above all, urgently necessary to fully unfold the creative initiative of all workers. The plant sections and special committees of the KDT will play an important part in this respect. The resolutions adopted by the Fifth Plenum should therefore request all tractor drivers and specialists of the MTS's, LPG's, and VEG's, as well as constructors and workers of the plants to suggest agricultural machines which can be standardized immediately, to designate those where standardized construction units can be used, and to describe parts which should be used in various machinery types. This is an excellent field for socialist group work; we therefore ask all plant sections of the KDT to work out concrete objectives and to fulfill them together with scientists and men of practical knowledge. Considering the necessary complex planning of standardization tasks, these activities should not be restricted to agriculture and agricultural technology but should secure the cooperation of other branches of the economy as well.

Beginning with quality definition and grading, standards must be established as complex definitions of production, transport, storage, and processing, until products reach the consumer. For this it will be necessary to have the FV [not identified] "Agricultural and Forestry Technology" yearly discuss the program of standardization tasks within a larger circle, the participants being asked to give their votes. Thus a certain number of men of practice, constructors, and scientists will be able to help coordinate such programs; this has not been possible in the past.

It should also be decided whether delays for raising objections to draft standards could not be shortened. Naturally, this would mean securing widespread cooperation, allowing an inclusive survey of drafts before their ratification. The

necessity of such measures is shown by the following occurrence in the electrical engineering field. A branch standard for insulators for electric fences had been confirmed without having been presented to the agricultural or agrotechnical institititions chiefly interested in such electric pasture fences. The result was a technologically obsolete branch standard. The Standardization Office should investigate the possibility of improving organization methods and help work out standards in accordance with technological and scientific progress.

The Ministry of Agriculture and Forestry should also pay more attention to standardization problems. Their cooperation is not required in the working out of agricultural machinery and tractor standards, and in decisions concerning standardization goals; they should, however, create standards for various production processes and agricultural technologies, which would serve as a basis for agricultural machinery and tractor construction.

When working out requirements, standardization and normalization should be kept in mind from the very beginning. For this purpose we would suggest that drafts contain requests cancerning degrees of standardization and the percentage of re-usable parts of new machinery. Standards should also be worked out for testing methods to attain standardized evaluation. Considering the steadily increasing internation division of labor, the creation of standarized test methods is imperative.

The Fifth Party Meeting, the Sixth LPG Conference and the Fifth Plenum have designated the task to be fulfilled in the field of agricultural technology. A realistic evaluation of the present situation leads to the admission that a great deal of hard work will have to be done in order to fulfill these demands.

The rate at which we will succeed in developing socialist group work will also be the rate at which we can fulfill our tasks. It is certain that the working methods now in use are inadequate. All agricultural technicians working in agriculture and industry, in research and administration, members of the KDT above all, have the privileged obligation of cooperating in this all-important task by joining socialist

and voluntary group work. We shall then be in a position to not only reach the international level of agricultural technology (as we did in other fields) but also to co-operate in its determination. Beginnings can already be noticed; all efforts should now be concentrated and aimed at the goal. We shall thus be able to reach our objective.

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The Maintenance of Agricultural Machinery After Its Transfer to the LPG's

[This is a translation of a report given as part of a lecture series of the Chamber of Technology at the Seventh Agricultural Exhibition in Markkleeberg by Dr Engr K. Nitsche, KDT, Technological University of Dresden, Institute of Agricultural Technology. Published in Deutsche Agrartechnik, Vol IX, No 9, September 1959, Berlin, pages 397-401; CSO: 3278-N/c]

The loaning of the MTS technological equipment to the most progressive among the LPG's can be considered the beginning of a new and very decisive phase in the transformation of the economic structure of our agriculture. It is an undeniable fact that this measure, which directly transfers the means of production to the producer cooperatives, offers new possibilities for an increase of productivity.

This development also touches the maintenance of agricultural machinery. Therefore, we have to see how the maintenance of agricultural machinery and tractors can best be adjusted to the new state of affairs.

It should be stipulated that the following communications are based on experiences of the author in cooperation with colleagues from the fields of practice and science. For the time being, these communications are meant as suggestions only and serve as a basis for discussions on this problem.

The problem itself is very important, as agricultural machinery maintenance has been considerably developed in recent years; this development is by no means finished as yet, and it leads from artisan shop repairs to industrial maintenance. The goal we wish to reach is the creation of a standardized maintenance system, based on technological and scientific achievements, for the entire socialist sector of agriculture. The chief characteristics of this development are the following: transition to planned, preventive maintenance of agricultural machinery and tractors; introduction of rational work organization, using industrial methods, in all

workshops--for example, the fixed line method, the specialization and cooperation of maintenance plants, and the planned processing of worn parts.

In the course of this development, originally prevalent ideas (dating from times when craftsmen and peasants were the sole producers) have been gradually eliminated and replaced by the solution of maintenance problems by engineering methods. This process is an economic necessity and must not recede or be interrupted by the fact that the machinery has now been given to the LPG's. Thus the transfer of the machinery has to be carefully prepared from this angle too.

It should be considered that, as a consequence of the concentration of all agricultural machinery and tractors in the MTS's, cooperative farmers had almost no possibility of acquiring experience in the technological, organizational, and economic questions connected with extensive mechanizatiln. It would therefore be a mistake to take for granted that they will at once have the knowledge and experience necessary to work with such machinery. This is where the danger of recession lies, a danger which should be prevented as follows:

1. Transfer of Experienced Specialists

The MTS's should transfer not only the tractor brigade when handing over the machinery but also workshop employees and executives. The minimum requirements, as regards executive technological cadres in a large-scale LPG (2,000 hectares), are the following:

1 technological executive (engineer, member of LPG Board)
1 workshop manager
1 manager
1 manager of tractor and agricultural machine operations (brigadier)

This is a minimum. Fully mechanized large LPG's will, moreover, also need a plant engineer for inner mechanization.

Cadres experienced in agricultural technology being scarce, fluctuations connected with the transfer of machinery should be carefully avoided.

2. Qualifying LPG Farmers

Under the central supervision of the Ministry of Agriculture and Forestry, short courses should be held on bezirk or kreis levels, first of all for board members of LPG's taking over machinery. These courses should acquaint them with all technical, economic, and organizational problems of machinery operation and maintenance.

It is necessary to take these measures soon, as otherwise it will be impossible to avoid technical deterioration of the machinery and a further increase in spare part consumption. The MTS's can be responsible for the maintenance of machinery handed over to an LPG for a given period of transition only.

It should also bee clarified to what extent maintenance conditions are changed by the transfer of machinery to the LPG's. The chief characteristics of this change are, as far as maintenance is concerned, as follows:

1. Less Machinery

If, for example, 60 to 100 tractors, 20 to 30 each of harvester-binders, drill machines, manure distributors, etc. were concentrated in a MTS, a large-scale LPG (2,000 hectares) will not have more than 30 to 35 tractors, and three to five harvester-binders, drill machines, manure distributors, etc. Considering the size of MTS machinery equipment, the overhauling of similar-type agricultural machines by belt-carriers was definitely possible. As the LPG's will have a small number only of machines of similar types, this system will be applicable in these special cases only.

This means that tasks will have to be reassigned between the LPG workshops and the state maintenance organs, such as MTS's, RTS's [not identified], and central state maintenance plants.

2. The MTS's Are not Entitled to Direct the LPG's

The MTS's cannot give mandatory maintenance directions to the LPG's. The following measures only can be adopted in order to secure the handling and progress of maintenance activities:

a) Load contracts should extend to certain obligations concerning maintenance.

b) Systematic persuasion, which, however, will not be successful unless supported by practical results.

State maintenance organs will therefore have to prove that they can do the necessary jobs better, more cheaply, and more quickly than the LPG workshops. Otherwise, it can be preducted that the LPG workshops will try to do these jobs themselves; this, however, would not be satsifactory, since, considering the relatively small number of machines of similar types in the LPG's, this would result in a setback to the level of artisan shop repairs.

As we now have clarified most of the new conditions for maintenance operations, we have to designate the maintenance organs to be employed and the tasks they will have to fulfill-- i.e., to outline their working methods.

At present the agricultural machinery maintenance organization of the GDR has three levels:

1. The MTS workshops and their bases
2. The MTS special workshops as bezirk maintenance organs
3. The maintenance plants as central maintenance organs

This scheme will have to be altered as machinery is transferred to the LPG's, since maintenance bases will now definitely belong to the LPG's. Nevertheless, it would not be rational now to divide maintenance organization into most than three levels. For the future, the following levels are recommended:

1. LPG workshops as a base
2. MTS's and RTS's
3. Specialized maintenance plants

While the LPG workshop is a cooperative maintenance-repair agency, the MTS and RTS and specialized maintenance plants are state maintenance-repair organizations.

The LPG Workshop

Basically, the LPG workshop will have to be assigned the following tasks:

Care and upkeep of all agricultural machinery, tractors, and fixed installations, inasmuch as such work is not done by the tractor drivers and other service personnel.

Uncomplicated repairs of damage occurring in operation, using spare parts and spare construction units.

Each year, overhauling of uncomplicated agricultural machinery and tools, such as soil tilling tools.

Current repairs of fast-wearing parts; sharpening of plowshares, grinding of mower knives.

In order to aviod expensive workshop equipment which would not be fully utilized in an LPG workshop, the following should be kept in mind concerning LPG workshop activities:

Repairs in the LPG workshops should be restricted to disassembling, appraisal of damage, replacement of defective parts or construction units, mounting and assembling jobs, quality control.

The repair of damaged parts or construction units is then executed in specialized state maintenance plants. This principle will restrict the work in LPG workshops to the simplest jobs, and no expensive workshop equipment will be needed. Periods of idleness resulting from necessary repairs will be short and workshop premises fully utilized.

However, the prerequisite for this method is the immediate availability in sufficient quantities of spare parts and units, either new or reconditioned in maintenance plants.

Concerning tractors, the LPG workshop should be entrusted with lesser maintenance jobs, mainly measures for reducing wear and tear, such as lubrication, change of oil, cleaning, filter care, etc.

These jobs should be done regularly and conscientiously, as they are decisive for the extent of wear, and consequently for the amount of maintenance costs and the number of necessary

spare parts. Surplus costs caused by inadequate care cannot be compensated for by even the most rational maintenance systems. Therefore the LPG's should be responsible for all maintenance jobs of decisive importance in the economical operation of machinery.

The opinions of men of practice still differ as to whether LPG workshops should take over maintenance of Groups I to IV or I to V. This question should be decided individually in each case. Group V is not very complicated; its chief characteristic is a gear control with open lid. The LPG's should not be required to undertake long drives to the RTS's to have this done. Loan contracts should contain the clause that Group IV maintenance is the only one pertaining to the competence of the RTS's.

Formerly, the yearly overhaul of agricultural machinery extended to already existing damage only. This method, however, does not warrant the impossibility of new damage during campaign work. Progressive MTS's are now using a new preventive method: each machine is subjected to pre-campaign overhaul between two periods of operation. Machines are disassembled to an extent permitting the examination of each part susceptible to wear. All parts and construction units which do not ensure impeccable working in the entire period of the next campaign are exchanged or repaired. Experiences with such machinery are excellent; it can be saie that these machines give practically undistumbed service throughout the campaign.

This outstanding method should also be adhered to by the LPG's when taking over machinery. Pre-campaign overhaul is best done in series in the fixed line system, which means that surplus work connected with this overhaul is practically nonexistent, thanks to the application of this rational working method. The yearly pre-campaign overhaul of complicated machinery should therefore be entrusted to the RTS's, as they alone have adequate fixed line equipment. Simpler machinery, soil-tilling, sowing, and cultivating tools only should be overhauled in LPG workshops, but here too rational organization calls for fixed programs, with exact spare part planning, employment of unskilled help at times when other work is scarce, and division of labor according to construction units. The competent RTS should particpate in quality[control.

The yearly pre-campaign overhaul in the RTS also presents the advantage that a state organ is in a position to make a thorough annual inspection of the machinery loaned to the LPG.

The division of tasks should not be schematic. Exceptional conditions, such as a long distance from the RTS, good workshop conditions in the LPG, etc. can justify individual solutions. These should, however, always be based on calculations proving their economical soundness.

The following characteristic data have been computed for the workshop of a large-size LPG (2,000 hectares):

Workshop premises:

The workshop should be large enough to simultaneously hold two to three tractors, two or three agricultural machines, or one large-size machine and two plows.

Personnel:

1 workshop manager who also administers the spare part storage
2 motor mechanics
2 to 3 agricultural machine mechanics
2 blacksmiths (one of them a farrier)
1 cartwright
1 electrician
1 turner
1 tank overseer who also distributes tools and material

Machinery Equipment:

Approximately corresponding to MTS base equipment as used to date, plus a lathe (Drehmaschine) and a shaper or cutter, also wood-working machinery.

As long as adequate workshops are not yet available, barns or shelters can be fitted as provisional workshops in periods of overhauling. Cooperation with local craftsmen at such times should also prove helpful to the LPG.

A large-scale LPG usually possesses around 60 to 80 tractor trailers. Since each trailer needs about 70 hours of maintenance work per year, two AK's [not identified] are constantly engaged in trailer maintenance. As trailers can be transported over long distances at low cost, it might be advisable to consider central maintenance plants for them. Should maintenance be undertaken by the LPG itself, two additional AK's and an adequate workshop area would have to be provided.

The MTS and RTS Workshops

Maintenance tasks assigned to MTS's and RTS's are as follows:

Planned maintenance of trailers (Maintenance Group VI, basic overhauls);
More complicated repairs of damages contracted by agricultural machinery and trailers while working;
Mounting and maintenance of yard installations;
Storing of spare parts, exchange parts, and construction units.

Besides, at least one RTS per bezirk should be assigned for guarantee jobs and customer service connected with agricultural machinery and tractors.

This listing shows that maintenance jobs can be divided into two groups: those planned well in advance and suitable for organizations wofking on industrial patterns, and jobs that cannot be foreseen and have to be done in the shortest possible time.

These distinctly differing activities should not disturb each other; consequently, it will be advisable for the RTS's to separate the premises and the organization of industrial and craft divisions engaged in maintenance work. The following scheme is suggested:

Division I: planned repair of tractors
Division II: planned repair of agricultural machinery
Division III: guarantee jobs, customer service, emergency repairs on agricultural machinery and tractors; mounting of yard installations

In addition to these divisions, a mechanical workshop, a smithy, a welding shop, spare part and exchange part stocks will have to be at the disposal of the three divisions mentioned above; those will not be described here.

Division I

[This division] has to take care of the planned maintenance of tractors. Computations connected with a model plant in Halle Bezirk disclosed that an RTS working for an area of about 8,000 hectares of LN [not identified] will have to take over the maintenance of the following tractors:

30 tool carriers
35 tractors of the 30 horsepower class
55 tractors of the 40 horsepower class
12 chain tractors
4 cable tension aggregates

This calculation was based on tractor units of approximately 60 motor horsepower per 100 hectares.

In the workshop three or four tractors are simultaneously on hand. The work is done according to working process plans, elaborated in conformity with the construction unit system.

Jobs are not schematically assigned; the kind and size of maintenance measures is individually determined for each case according to the appraisal of the damage. This will encourage the LPG's to reduce the wear and tear of tractors by better care and efficient operation, thus decreasing maintenance costs and the consumption of spare parts.

In the RTS's too, damaged complicated construction units will be exchanged and sent to specialized repair plants for repair. The exchange of parts and construction units is made according to the principle that, after the tractor has been examined at the RTS, none of its parts and construction groups should be in danger of being out of order before the next examination (Maintenance Group VI). The now valid maintenance regulations should be changed accordingly.

The planning of an even rate of work assignment to the workshop should be in accordance with the maintenance plan. It remains to be seen whether the assignment of general maintenance job cycles according to fuel quantities is rational

under these changed circumstances. It is certainly true that fuel consumption shows precisely the stress and, together with it, the wear of machinery (at least of the tractor motor), and it is therefore a suitable index for maintenance. On the other hand, the supervision of fuel consumption by stamp booklets requires a very high degree of care, exactitude, and discipline. Thus the cases in which the fuel stamp system is correctly carried out are relatively rare in practice. This system does not seem to be suitable for the LPG's. The author would suggest that the cycle of general maintenance jobs be established according to periods of time. The date of the next general maintenance job should be computed from the tractor's average output and the corresponding fuel consumption. This date might be shown on a suitable part of the tractor and the relative dates would thus be under control. This would certainly be an efficient help toward assigning an even rate of work to the RTS's. Each time an overhauled tractor leaves the workshop the RTS would be in a position to plan the date of the next examination. This date being inscribed on the tractor, the LPG would be able to ascertain at any time when the tractor has to be taken to the RTS for the next survey. Any neglect of the deadline could be noticed promptly and without paper work.

The timing of the maintenance cycle according to these principles has for decades given excellent results on the East German Railways.

Division II

[This division] is assigned the planned overhaul of agricultural machinery, and it executes all the year-round precampaign and basic overhauls of agricultural machinery according to a given plan. Work is organized according to the fixed line system, and machines of similar types are grouped into series. One-year contracts are made with the LPG's for these jobs, contracts similar to those now existing between the MTS's and the MIW's [presumably, Motoreninstandsetzungswerke; Motor Repair Plants] concerning basic overhauls of motors. The LPG's are obliged under contract to bring the machines on fixed dates for overhaul in series. Machines not available on such dates can only be overhauled by craftsmen in Division III. In such cases the LPG has to pay 20 to 50 percent more. The typical case mentioned above shows that the bezirk workshop in question has to execute the following precampaign overhauls:

25 harvester-threshers
12 harvester-chaffers
12 harvester-loaders
15 full-capacity potato diggers
25 full-capacity beet diggers
30 cleaning and collecting presses, etc.

Machinery that has been subjected to yearly precampaign overhauls usually does not need basic overhauls.

Division III

[This division] is destined for customer service, guarantee jobs, and emergency repairs and cannot therefore be bound by long-term plans. It has to be ready for quick help, for "fire-brigade" work." These conditions allow for handicraft methods only, but here too work can be simplified by the use of exchange parts and exchange construction units.

Division III also includes motorized repair brigades (workshop cars, workshop motor bicycles) destined to eliminate more important damage in the field or in LPG workshops. Outside of campaign work, these motorized repair brigades are also available for the mounting and maintenance of fixed installations of the LPG's.

All three divisions need their own brigadier and staff. Staff exchanges between the three divisions are possible when made necessary by urgent jobs. Thus Division III will certainly be under pressure during campaigns. Such an exchange of manpower should, however, be planned well in advance, to avoid disorganization in the work schedule of Divisions I and II.

The RTS objectives (which do not include maintenance work) will not be described here, and for this reason their staff structure will not be dealt with either. It should, however, be noted that the RTS's definitely need experienced agricultural engineers to instruct the LPG's on the use and maintenance of machinery, to control maintenance jobs in the LPG workshops and the technological state of LPG machinery, and to act as technological counselors of the LPG's.

It is further necessary to establish fixed prices for all scheduled jobs of the RTS's. These prices should not be globally established for the entire work executed--for example, on a Group VI maintenance job or the precampaign overhaul of

a certain machine--as this would mean that the maintenance costs of a poorly kep machine would be reduced at the expense of the maintenance of well-kept machinery. This is why prices should be established separately for all individual jobs which are likely to occur in the course of maintenance work. The cost of the entire overhaul can then be computed from the total of the fixed prices of the jobs which the appraisal of the damages showed to be necessary.

It should also be noted that fixed prices have to be technologically founded--i.e., that they have to be computed on the basis of optimal technology, according to definitely planned working processes, work norms, and norms of spare part consumption. These data should be procured from the most efficient workshop, even though this might result in some workshops having planned temporary losses at first. This fixed price method will introduce a progressive development of RTS work.

Specialized Repair Plants

These will have to be developed cut of the MTW Special Workshops (SpW) and Motor Repair Works (MIW).

The SpW's in their old form, with a global repair program, will no longer be necessary, as the RTS's will take over their tasks. Fommer SpW's will specialize in line-produced repairs of large quantities of similar construction units and in the line-processing of certain parts subject to wear. This development of the specialization and cooperation of specialized MTS plants is already under way. In the future, repair work will not be restricted to motors but will extend to pinions, hydraulic installations, electrical equipment, and to the processing of certain parts subject to wear. Such plants will have the character of industrial plants. They will work on conveyor belts, using special machinery and conveyors, and have special equipment. Specialization will help toward intensive mechanization and automation. In order to facilitate the contact between LPG's, MTS's, and these specialized workshops, exchange stocks will have to be set up in all bezirks where defective construction units and worn parts can be exchanged for repaired or processed items. Such parts will be delivered to the premises of these bezirk exchange stocks

by collective transports of the repair plants. This exchange system will enable the RTS and LPG workshops to do all repair jobs with relatively simple equipment, at low cost, and with the shortest idle periods.

Transport costs should be low; specialization will therefore have to be restricted to the repair of parts and construction units. Machines will be repaired on conveyor belts only in bezirks where important machinery equipment is concentrated in a restricted area. In such cases only (they will have to be designated after careful calculation) will the setting up of repair plants for complete agricultural machinery units, such as harvester-thresher repair plants, be a rational move.

The maintenance problems arising from the transfer of machinery to the LPG's have thus been surveyed. The solutions described above should be considered as suggestions and are open for discussion.

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EAST GERMANY

The Cotton Industry

[This is a translation of an article by Alfred Krahl, Textile Engineer and Chief Director of the VVB Cotton, in Deutsche Textiltechnik, Vol IX, No 9, September 1959, Berlin, pages 457-460; CSO: 3335-N/a]

Development of Production from 1949 to 1959

The workers of the cotton industry have decided to present the republic with an 80-percent fulfillment of the plan on 7 October 1959, its tenth anniversary. This gift to the first workers' and peasants' state in Germany is the result of a long and constant struggle to satisfy the constantly rising demand of our population, a successful struggle against difficulties large and small, of an untiring struggle for the victory of socialism.

The cotton industry workers can look back with pride upon the magnificent development of their industry. They know that each one of them has contributed his share to the achievement of this success, but they also know that only in a workers' and peasants' state--only under these new social conditions in our republic--is such a development possible. Therefore, they recollect with gratitude the fact that our government took measures that permitted an improvement in the working conditions in our industry, which in turn made possible a considerable rise in their standard of living. This recognition of their work to date obliges the cotton industry workers to work for further great achievements. Therefore, with healthy optimism and enthusiasm, they will start to accomplish the main economic task by 1961.

The tenth anniversary of our republic is a good time to review and appraise the work produced in the cotton industry. The cotton industry is not lagging behind other industries in regard to production.

If one visualizes what a heritage our workers' and peasants' state has also received in the cotton industry area, then the successes achieved so far speak for the untiring efforts of our

workers. From 1949 to 1959 it was possible to increase the per capita production by about 75 percent. Here the average performance according to technical indices of basis No 34 [presumably a norm index] in the spinning mill increased from 15.6 grams per spindle hour to 19.95 grams per spindle hour and, in the weaving mill, from 12.500 million woofs to 26,298 million woofs per Jacquard loom per year.

This magnificent improvement in output in the weaving mills has been made possible only by the increase in the rate of automation. Thus thepercentage of automatic power looms increased from 4.0 percent in 1949 to 34.2 percent in 1959. In this connection, the average revolutions per power loom increased from 117 in 1949 to 147 revolutions per minute in 1959. These measures permitted an increase in the production of cotton and cotton-type fabrics during the same period from 80 million square meters to 226 million square meters.

While struggling to increase production, great care was taken to improve the quality of production. The workers in the cotton industry can take pride in the fact that their work has earned international recognition. This can be seen in the 60-fold export of cotton and cotton-type fabrics during the 1949-1959 period. During the same period, trade relations were considerably expanded. While in 1949 we exported to only four countries, we now have trade relations with 32. This development is a clear indication of the extent to which the cotton industry has contributed to the prestige of our republic in foreign countries. The following examples will give a comprehensive survey of the development in the cotton industry from 1949 to 1959:

	Production in tons	Number of Spindles	Number of Employees
Floha Cotton Spinning Mill			
1949	4,143	158,812	2,487
1959	13,857	243,248	4,177
Karl-Marx Stadt Cotton Spinning Mill			
1949	3,007	86,000	962
1959	8,400	97,000	1,720
Venusberg Silk Spinning Mill			
1949	2,095	48,184	1,300
1959	5,115	120,464	1,922

In the people-owned Floha Cotton Spinning Mill, for instance, production increased from 8.9 grams per spindle-hour to 10.2 grams per spindle-hour and from 490 meters per hour to 597 meters per hour.

Not only in the spinning mills but also in the weaving plants, a steep upward trend is to be noted, which can readily be seen from the following examples:

	Elsterberg Textile Works		Oberoderwitz Damask & Ticking Weaving Mill	
	1949	1959	1949	1959
Production development in 1,000 square meters	770	8,050	5,800	13,705
Number of looms	356	670	950	1,554
Number of employees	187	706	1,450	1,812

These considerable increases in production by the cotton industry were necessitated by the division of Germany and the resulting efforts to remove the disproportion of productive capacities. One has to bear in mind that only 18 percent of the spindles and approximately 25 percent of the cotton power looms remained in the territory of the GDR. Besides the expansion of the productive capacities, the available capacities had to be exploited to the maximum in order to achieve an increase in production. Therefore, the three- and four-cylinder spinning mills have been working in three shifts for the past twelve years. It has to be admitted that our female workers have been exceptionally overloaded.

During the last few years the importance of the cotton industry has constantly increased. This is stressed by the fact that of the over-all volume of the textile industry in the republic, approximately 60 percent of the threads and about 50 percent of the fabrics are being produced by the cotton industry.

The Tasks of the Cotton Industry in the Seven-Year Plan

In the achievements to date, however, the development of the cotton industry cannot be regarded as complete. The Seven-Year Plan is putting great tasks before this industrial branch. In the first place, the workers of the cotton industry will put all their efforts into achieving the main eco-

nomic goal by 1961. They are aware of their responsibility, because in their industrial branch a significant number of consumer items are produced, of which the per capita consumption in the GDR has to surpass that of West Germany. This applies to such items as bed linen, table linen, poplin, gabardine, shirting, dress and apron fabrics, corduroy, work clothes, etc., which go into consumption either directly or by way of manufacturing. But a great part of the technical fabrics, such as synthetic leather and materials for bookbinding, also serve as finished products for the satisfaction of individual demands.

The following table gives a survey of the production goals of the cotton industry for 1965:

1959 = 100	1961	1965
Total production	122.8	188.4
Two-thread and three-thread fabrics	114.5	150.0
Two-thread and Vigogne yarns	111.0	127.6
Cotton and cotton-type fabrics	119.7	164.4

For further improvement in the supply, the following items are being developed:

1959 = 100	1961	1965
Bed linen and sheets	109.8	169.0
Ticking	133.9	147.4
Table linen	106.1	120.4
Underwear	123.0	270.0
Lining and padding materials	113.5	133.9
Work clothes fabrics	108.3	125.6
Outer clothing fabrics	107.7	132.4
Velvet and corduroy	133.3	154.0
Technical fabrics	96.3	123.4

The solution of these tasks is based on the socialist reconstruction of the cotton industry plants. Socialist reconstruction in the present period is the sum total of all the measures, allowing us a maximum gain of time in the economic competition between socialism and capitalism, thereby leading to a basically higher level in the national economy and to rationalized production wherein the application of advanced technical and scientific findings must be guaranteed. The reconstruction period can be divided into two parts. The first period has the task of overtaking West Germany in the per capita consumption of textiles by 1961; the second period,

from 1962 to 1965, will be used for the consolidation and further strengthening of our superiority over capitalism and, through these economic and political successes, to the shortening of the time required for the final victory of socialism.

Mechanization and Automation of the Cotton Industry

In order to step up production in the cotton industry, it is necessary to apply the most advanced techniques and the most rational production methods. The problem consist not only of installing high performance machines but also of utilizing the existing machines in the most effective manner. In this respect, semi-mechanization and semi-automation are of utmost importance, for by these means a considerable increase in the productivity of the old machines can be achieved. All problems in connection with this will be solved with the cooperation of all workers.

The BfE [perhaps Buero fuer Entwicklung; Development Office] of the plants places before the employees the tasks for a certain period. Thereby, the workers are informed of the points of main effort and are also interested in the solution of certain problems. The spinning mills, for instance, have been given the following tasks:

1) Use of automatic winding change devices for the beaters (picking machines).
2) Arrangement of pneumatic dischargers on all carders.
3) Mechanization of the conveyance of the beater winders to the carders.
4) Installation of mechanical blow-off devices on the drawing frames, flyiers, ring spinning machines, sheds and spooling machines, twisting and carded yarn ring spinning machines.
5) Installation of devices for the automatic underwinding and stoppage of the machines with full cops on all ring spinning machines.
6) Installation of devices for the pneumatic conveyance of the raw materials in the Vigogne spinning mill from the carder to the mixer and from there to the box feeder on the carding comb.

Especially in the spinning mill, where, even by international standards, no complete automation can as yet be achieved, such measures facilitate work and increase the efficiency of the machines.

The main attention in the weaving mill is centered on automation. Since the rate of automation has been raised from 4 percent to 34.2 percent at present, it is the task of the cotton industry to riase this rate of automation to 90 percent. This can be achieved only by liberal use of auxiliary and fully aotumatic machines. The relation between fully automated machines and such with auxiliary devices, under the jurisdiction of the VVB Cotton, has changed as follows:

Out of 1,000 power looms in 1959, 342 were automatic, of which 236 were fully automatic =	69 percent
and 106 had auxiliary automatic devices =	31 percent
In 1965, out of 1,000 power looms, 900 will be automatic, of which 747 will be fully automatic =	83 percent
and 153 will have auxiliary devices =	17 percent

These figures show the great importance of automation. From 1959 to 1965, jet power looms from Czechoslovakia and power looms of the "Neumann" type will be installed in great numbers.

Parallel to the automation in the weaving mills runs the automation of weft spooling; for every power loome one weft spindle is planned. The enlargement and automation of the weaving mill in the weft spooling section during the 1959-1965 period requires an increase of spooling installations up to 154 percent, in addition to an effective meter output rise to 120 percent.

In general, automation and mechanization in the spinning millis is less advanced than in the weaving mills. But only warp spooling must be considered an unsolved problem.

During the past ten years very little attention has been paid to finishing. On account of this, the plants fell behind in the technological field. In order to catch up and raise the quality of the product, an energetic improvement program has been launched so as to modernize the equipment. The main effort here is directed to the use of modern, high-performance machines suitable for a continuous production process.

Especially in the bleaching and dyeing fields considerable progress has been achieved. With a continuous dyeing installation, for instance, a rise in productivity of about 200 percent is being achieved. Even more favorable results are obtained with continuous, full-width bleaching installations.

The textile machine industry has been developing such installations intensively, and good results have been achieved. The VEB "Textina" plant in Zittau furnished to the VEB Supply and Synthetic Fabrics Processing Plant in Reichenbach-Unterheinsdorf a full-width bleaching installation, which is still being tested. One can say that with this installation we have reached the international level of development. In this case, the cooperation between the machine engineering plants and the textile plants has been very successfull--an example to be widespread by all means.

The technical development in the cotton industry would not be completely presented if we did not refer to the introduction of a new technique in this industrial branch. For the production of nonwoven, flat fabrics, two new processes will find wider application during the coming years. It concersn Floretta, in the first place, and Malimo in the second. These two products will find ever wider application in the future. To begin with, Floretta will replace the padding fabrics and Malimo will enrich the variety in towels.

Conclusions

In the reconstruction of the cotton branch of the industry, besides the use of new machines, the introduction of rational methods with the available machines become necessary. For both methods it is necessary that the workers' cooperation in the management of the national economy be extended. It should also be noted that the measures for specialization, cooperation, and concentration have brought about a complete removal of the remnants of the capitalistic fragmentation in our production program. This critical statement on the cotton industry made by Walter Ulbricht during the conclusions of the Fifth Party Congress of the Socialist Unity Party of the GDR should be the guideline of our efforts. Great care should be taken in the utilization of the local industries, the use of local supplies, the carrying out of the specialization programs in the local industries, as well as the achievement of a greater state particioation in the important plants of the local industry. This is necessitated by the high demands put before the German cotton industry for the full extent of the main economic task.

Photo Captions

1. Textima ring spinning machines in the Karl-Marx Stadt VEB Cotton Spinning Mill.

2. Karl-Marx Stadt VEB Cotton Spinning Mill--view of a carding hall equipped with 250 Textime shifting-lid teasels (Wanderdeckelkarden).

3. Floeha VEB Cotton Spinning Mill--automatic winding change device on a newly developed Textima single-process beater.

4. Venusberg VEB Find Spinning Mill--formerly: short separators and spinning rings made of steel (left); now: tall separators and spinning rings made of polyamide with steel fixtures (right).

   The new polyamide spinning rings with steel fixtures guarantee a more quiet running and thereby greater performance. The tall separators were installed to avoid torn threads whipping into adjacent threads and thereby causing other thread breaks.

5. Venusberg VEB Fine Spinning Mill--view of a rebuilt flyer hall.

6. Elsterberg VEB Textile Mills--a weaving department taken over in 1953 with antiquated working places and machines ready to be scrapped. Work safety was by no means adequate. (Photograph was taken before reconstruction in 1954.)

7. Elsterberg VEB Textile Mills--fully automatic weaving department after reconstruction of Plant I in 1959. The ES II Textima automatic weaving machines have been equiped with Type DSWZ Jacquard machines. The weaver treads inside the automatic weaving machines were replaced by rubber runners. The automatic machines are fastened onto the floor. One woman weaver handles 14 Jacquard automatic machines. The weaving departments were constructed for complex brigades and guarantee the best working operation through the connection of the weft bobbin automatic machines (front right) with the automatic weaving mill.

8. Unterheinsdorf VEB Equipment and Synthetic Products Processing Plants--a Textima continuous bleaching and washing aggregate.

9. Unterheinsdorf VEB Equipment and Synthetic Products Processing Plants--a Textima continuous bleaching and textile intake machine for the bleaching aggregate.

1954

EAST GERMANY

Wool and Silk Industry

[This is a translation of an article by Wolfgang Trautloft, Chief Director of the VVB Wool and Silk, Meerane, in Deutsche Textiltechnik, Vol IX, No 9, September 1959, Berlin, pages 461-464; CSO: 3335-N/b]

1. Structure

The wool and silk industry of the GDR consists of the worsted spinning mills, wool combing plants, wool washing plants wool and silk weaving mills, as well as finishing plants, which undertake the final refinement of the fabrics produced by the silk weaving and wool weaving mills--including prints. The ownership in this branch is varied. There are centrally directed people-owned plants, local people-owned plants, socialist cooperatives, plants with part government ownership and private enterprises.

The central organ for the wool and silk industry of the GDR is the Association of People-Owned Enterprises [VVB] Wool and Silk, in Meerane, which supervises the whole centrally directed branch of the industry and a great part of the factories with part government ownership.

2. Production

The factories which at the war's end were nationalized and organized in various industrial administrations of the wool and silk industry were, in regard to their organization and technical set-up, capitalist enterprises of medium and small size.

In order to bring these plants into production again, the remnants of war production set-ups had to be eliminated. With the depletion of stocks, raw materials of low quality were utilized, which of course was reflected in low-quality products.

Because of the willful partition of Germany in 1945, the state was unable to supply the capital for the development of

the wool and silk industry. The whole effort was directed toward the removal the disporportions created by the partition of our country. For this reason the consumer goods industry in these early years had to make thorough use of all resources within the industry.

In utilizing their own resources, great stress was laid upon internal competition and rationalization. These measures along brought a 100-percent rise in labor producitivity during the past few years. Besides these problems, many organizational improvements were made, which, in the form of standardization of products within the plants and sections, were expressed in a true specialization of production and a sweeping standardization. The sum of all these internal measures in the branch of wool and silk weaving brought about an increase in the loom operation factor [Stuhlbedienungsfaktor; possibly ratio of looms operated by one man] from 1.7 in 1947 to 3.46 in 1957.

In the past ten years, besides the mobilization of all internal resources for the highest possible economy of state funds for investment, great attention was paid to the problems of safety as well as to social and cultural welfare of the workers. Here the capitalist inheritance had to be eliminated as quickly as possible. Our workers' and peasants' state, at the request of the workers, earmarked considerable sums for improvement of working conditions. Therefore, it can be said that the social and hygienic conditions in the plants of our industrial branch have been improved in an exemplary manner.

The production index broken down into branches for the Seven-Year Plan up to 1965 is as follows:

2.1 Worsted Spinning Mills

The production program of the worsted spinning mills branch includes all the wool-washing plants, combing plants, and fine spinning mills of all worsteds in the republic for the subsequent processing industrial branches, such as worsted weaving mills, underwear industry, decorative fabrics industry, bast fibers industry, and in addition to that the total production of knitting yarns.

The directive for the total production of worsted yarns specify the following quantities (in percent):

	1959	1961	1965
Total	100	113	122
Worsted wool	100	141	170

It is to be noted that at present 96.6 percent of the available productive capacity of this branch is in the hands of the centrally directed people-owned industry.

Only about 40 percent of the worsted yarns of the total production of this industrial branch are being channeled into the weaving mills attached to this branch and the remainder covers the demand of the underwear, decorative fabrics, and bast fiber industries.

Of decisive importance for the increase of worsted yarn production to 122 percent in 1965 is the development of the average lot number (Durchschnittsnummer). At present it is No 34.4 (30 tex) and it should reach No 37.5 (28 tex) by 1965.

2.2 Wool and Silk Weaving Mills

The branch of the wool and silk weaving mills produces the republic's total supply of fashion apparel fabrics for suits, top coats, and dresses, as well as the various technical fabrics. It also has to supply--besides satisfying the demands of the population via the tailoring section--the processing industry of ready-made apparel and the export industry.

The prompt delivery of high-quality fabrics for export is of great importance, since vital imports depend on it.

The production program, besides the one already mentioned, consists of a number of textiles, of which the most important are listed below:

- Silks for umbrellas and lampshades
- Toy silk
- Satin for dolls
- Ribbons
- Satin for bellows
- Brocaded taffeta
- Organdies
- Insulation fabrics
- Fire-resistant fabrics
- Embroidery canvasses
- Covering silk
- Lining materials
- Synthetic leathers, etc.

The directives for the production of fibers are as follows:

	1959		1961	1965
Total fabrics	100		115	136
Worsted fabrics	33.6	(100)	122.5	141
Worsted wool	35	(100)	158	202
Silk fabrics	38.6	(100)	130	164
Synthetic silk fabrics	10	(100)	250	625

2.3 Textile Refining

The plants of the textile refining industry are a supplemental industry, with the exception of the plant with their own printing facilities and distribution. Therefore, the production of these plants is a predominantly labor-intensive process which is commissioned by the weaving mills. The development of the production of these plants is analogous with that of the wool and silk weaving mills, since they have to absorb and process the production of the apparel fabric weaving mills. Because of the variety of stages of refining, the refining plants are assessed only by value, since the quantitative assessment does not give a clear picture of the results. The directive for the refining industry calls for an increase by 1965 expressed in percent of value as follows:

1959	1961	1965
100	140.5	201

3. The Most Important Problems of the Wool and Silk Industrial Branch Until 1965, After Allowing for the Introduction of the New Techniques

3.1 Expansion of the Washing and Combing Capacity

Increasing the fine-spun capacity in combed yarn spinning mills demands a considerable increase in the combings production. Here it should be noted that, by a further investments in short spinning capacities--an increase of 3,000 metric tons per annum until 1965--great economies can be made in the investment in combings production. The expansion of the wash and combings production will be undertaken only with machines of the highest development, so as to get the highest return on these investments.

The center of the main effort in wool washing and wool-combing is the wool-combing plant in Leipzig, whose reconstruction has been declared a task of the state plan.

The following table shows in perspective the development of the wash and combed materials production of the industrial branch until 1965:

	Increase of Wash and Combing Production	Production of Leipzig Wool Combing Plant
1958	100	77.5
1959	130	70.0
1960	154	68.0
1961	170	71.0
1962	177	74.5
1963	182	75.0
1965	183	75.5
1965	192	76.5

3.2 Expansion of Fine-Spinning Capacity

The reconstruction of the branch spinning mills was to be achieved in such a way that they would not require a significant amount of additional workers or construction of larger production premises in order to fulfill the task of supplying combed yarns for the subsequent processing industry.

This will be achieved by substituting new K-5 ring spindle machines for the labor-consuming, unproductive "Selfaktor" capacity as well as the outdated ring spindle machines. On top of that, a considerable expansion of the short spinning capacities is planned, which, compared to 1958, should increase by 3,000 metric tons per year until 1965. Through the shortened process of short spinning, production can be raised without significant enlargement of the production premises. At the same time, a noticeable increase in productivity is achieved as compared to classical combed yarn spinning processes, since a number of treatments are eliminated.

While standardizing and specializing production, attention is being paid to a greater supply of short-spun yarns reaching the weaving mills, as well as the underwear knitting mills, insofar as the appearnce of the short-spun yarns allows them to be used only in certain articles suited for this.

Besides expansion of the fine-spun capacity, an improvement in lot sizes, as already mentioned, is being planned which will bring about an improvement in quality and more variety.

3.3 Automation of the Wool and Silk Weaving Mills

In order to reach the index of the plan, it is necessary that this branch be automated. Here too, it is desirable that the aim be achieved with the least investment of state funds, without great construction changes in buildings, and with the present labor force.

These tasks can be achieved only with successful automation so that by reconstruction of the weaving mills a full two-shift program with the present labor force can be carried through. This means that the available power looms, which since 1958 have been operated with a loom operating factor of 2.36, will be exchanged for automatic power looms with a factor of 8.0 by 1965.

The production program must be considered when introducing automation so that it can be a success; a consistent program of elimination of odd products and of specialization of individual plants which are at present nearly complete has to be carried out.

On the basis of the present production program, three main points of special effort are to be noted for the carrying out of the program of automation of the weaving mills: automation of silk weaving mills, worsted weaving mills, and weaving mills with production programs for cotton-like products (printing fabrices made of B synthetic wool).

3.31 Automation of Silk Weaving Mills

Of great importance in automating this branch are the rayon weaving mills, which specialize in the production of rayon lining materials, rayons for printing, etc. In order to get the advantages of true specialization in connection with successful automation, two plants of the wool and silk weaving mills have been reconstructed.

The next step in automating the silk weaving mills deals with the use of two- and four-color automatic weaving machines,

so that the majority of ladies' outer wear fabrics can also be produced on automatic power looms. The plan calls for a 75-percent automation of the power looms, and the remaining 25 percent pic-a-pic power looms will be used for the production of high-fashion apparel, so that the demands of the individual consumers can be satisfied.

3.32 Automation of Worsted Weaving Mills

In the worsted weaving mills, the plan calls for the introduction of automatic four-color machines for the production of fabrics for dresses, suits, and costumes.

Pattern effects with over four woven colors will still be made on pic-a-pic looms, since the use of automatic machines for such high-fashion articles does not warrant a high enough yield at present. The relation of automated to nonautomated power looms should approximate that of silk weaving looms by 1965.

As the wool and silk weaving mills progress in automation and concurrently the coefficient of operation increases, the superfluous weavers can be employed in manning the second shift, so that a full two-shift operation will ensue.

In changing to a higher degree of automation in the weaving plants, considerably more attention will have to be paid to the problem of absenteeism and sick leave of the basic production crews. The planning has to be done in such a way that substitute weavers can replace workers who are absent because of illness, holidays, or housekeeping days, so that a maximum exploitation of the productive means can be achieved.

3.33 Automation of Rayon Fiber Weaving Mills

Part of the production program of this industrial branch consists of the manufacture of rayon fabrics made of synthetic wool--B synthetic wool. Since we are dealing here exclusively with rayon articles, our first task is to automate the machinery for this manufacture. In regard to the degree of difficulty, we are concerned here with the simplest production of this branch of industry and it is understandable that the automation of these looms was taken up first in order to gain experience and to obtain profits rather than losses from these articles. Attachment automats

as well as fully automatic power looms produced by our own industry are applied here.

3.4 The Tasks of the Textile Refining Industry

Reaching the goals of the Seven-Year Plan of this industrial branch places special tasks before the textile refining industry, since it influences the manner of fabric production in a decisive way. Especially in enlarging the variety of merchandise through the use of synthetic fibers and silks, high refinement processes must be applied, thus influencing and determining the international standards of the garment industry. In this respect, high refinement processes command great attention, as these make it possible for the pattern effects of fabrics to be shifted from the weaving mill to the processing equipment, and thus influence the price relation even more favorably and simplify the technical processes in the weaving mills.

Besides these requirements, the perspective of the textile refining industry calls for further partial and full automation, which influences favorably the profitableness and labor productivity of this branch.

3.5 The Utilization of Local and Private Industries in Achieving the Economic Goal of the Industrial Branch

In determining the reconstruction of the combined industrial branch, the interest of the national economy must be taken into account--i.e., the reaching of the index of production with the least possible state investment, especially in construction, and with the present labor force. Of great importance is the exhaustion of the internal reserves of the plants. Whereas up to now the orientation for increasing production lay mostly with the centrally directed people-owned industry, now the efforts are being directed toward the exploitation of the internal reserves of the local and private industries for the benefit of the national economy of the GDR. The task of the management of the wool and silk branch, in cooperation with the local authorities and their centrally directed plants, is to raise local and private industry to the level of the centrally directed sector in matters of profitableness and labor productivity, in order to save the state budget considerable investment capital and thus hasten the completion of other undertakings.

In utilizing this realization for preparation of the reconstruction plan for the development of local and private enterprises of the industrial brancy, great attention was given to conveying, through the responsible people-owned supervisory plants, a clear development perspective to the plants concerned.

These plants being included in the plan for the industrial branch is one more proof that our workers' and peasants' state gives private enterprises great opportunities for development, which are in a steady upward trend, their existence being guaranteed under all conditions, as opposed to the conditions in the western part of our Fatherland. This is being stressed again by the present political situation; since the nuclear armament of West Germany, the textile industry there has slipped into another crisis which does not allow West German entrepreneurs any development.

Conclusions

Naturally, a successful solution of the problems mentioned above demands greater efforts from research and development, invention and suggestion systems, and from the Bureau of Standardization. The work of research and development has to delve into such fields as increased application of synthetic fibers and silks, the introduction of new, shortened techniques, as well as improved super refining methods. The invention and suggestion systems will have to be given more attention in connection with the unbureaucratic realization and application of improvement suggestions from our workers.

The goal of all our efforts must be to effectively rationalize and standardize the total production of our industrial branch, so that the most profitable methods will be applied, thus raising the standard of living of our population and proving the superiority of the socialist camp.

Photo Captions

1. Greizer VEB Worsted Yarn Weaving Mills--Type DB 2,000 drum and cross spool machines from the Czechoslovak People's Republic.

2. "Einheit" VEB Textile Mills in Glauchau--view of the weft winding room with modern automatic machines.

3. Elsterberg VEB Wool and Silk Weaving Mills--experimental installation for finishing warped rayon.

4. Elsterberg VEB Wool and Silk Mills--view of a reconstructed hall with Czech Elitex automatic weaving machines for silk.

5. "Einheit" VEB Textile Mills in Glauchau--view of an automatic machine hall with Czech ES II cotton automatic machines on which dederon is processed.

6. Elsterberg VEB Wool and Wilk Weaving Mills--Krauss looms for silk production with Trillitzsch attachment automatic machines.

7. Gera VEB Fashion Print Plant--portal print machines (Textima Zittau) in operation.

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EAST GERMANY

Textile Research and Development in the GDR

[This is a translation of an article compiled in the Documentation Section of the Karl-Marx Stadt Research Institute for Textile Technology, by a collective of authors in the GDR Textile Research Section, published in Duetsche Textiltechnik, Vol IX, No 9, September 1959, Berlin, pages 469-479; CSO: 3335-N/c]

The government of the GDR has supplied not less than 35.5 million DM for technological textile research and development in recent years. Not included in this sum is the new construction and expansion of institutes. How these sums were spent, what specific problems the institutes were dealing with, and what research and development problems have been solved in a relatively short period of time will be discussed in the following report.

We can show a proud balance sheet in the development of our national economy during the past ten years. The millions of workers in our republic have made tremendous efforts to organize production according to the most advanced results of science and technology, thus creating the prerequisites for a successful solution of the main economic tasks and, by the achievement of the goals of the Seven-Year Plan, to take a great leap forward in the further development of the national economy.

Not only are the rising prosperity and the future of every individual being further secured but we are also proving to the world the superiority of our socialist economy over the capitalist one.

In strengthening and securing our political and economic power, we are contributing to the preservation of peace in the entire world.

The complicated tasks lying ahead of us can be solved today only through the collectives. Socialist cooperation is the suitable form of work in our society. Textile research and technology, although directed toward such fields as fibers,

fiber formation, techniques of weaving and knitting or equipment, is an independent whole which can be supervised and properly directed only in the collective form.

While dealing with the particular problems of production and treatment of fibers, weaving, or equipment, the entire production process from fiber to finished product must be kept in mind. Basic and practical research go hand in hand. In recognition of these relationships, so significant for the textile research and development work, study groups, the so-called aktivs, were organized--which consisted of representatives of the basic and applied research branches, the fiber-producing and fiber-processing industries--and found many solutions to actual problems during the Second Five-Year Plan.

This year, accordingly, study groups were set up for certain central tasks, such as chemical fiber production and processing--namely, the study groups for polyacryl-nitril fibers and the study groups for polyester fibers, which in serious application of the principles of socialist cooperation and the experience of former aktivs, deal with the problems of production, processing, and the application of synthetic fibers.

The entire range of the textile technology and its development is being worked out by the "Textile Technology" AK [arbeitskreis; work circle], with its groups for the various research fields. Here textile science is represented, as well as the processing, chemical fiber, chemical, and textile machinery industries.

Industry is submitting research and development requests through the associations of people-owned enterprises [VVB] which are being dealt with by the competent groups of the "Textile Technology" AK, after having been discussed with the various specialist groups of the industries concerned. These groups guarantee the successful solution of the problems posed.

An overlapping of single problems over the important ones has been slowing down the development. A clear concentration on the main targets lying ahead of us, such as the rise in productivity and the related reconstruction of the cotton spinning industry, processing, and the application of chemical and especially synthetic fibers, and the further development of textile refining.

To reach these goals is our main concern for the present and the near future. We can reach them, however, only if we cooperate more closely with our workers by drawing them into our collective.

The Textile Research Institutes in the GDR

The problems of modern textile processing and textile machinery can be correctly solved only through scientific research. How involved and many-sided the problems are, what results have been achieved to date, and what still remains to be done can be seen by the work done so far in the individual textile research institutes. Such research is being generously supported by our government. Thus, in the past few years alone our 35.5 DM have been made available for textile research and development work, not to speak of the large sums invested in new construction and extension of institute buildings and their maintenance. The best way to thank our government is to try to solve even faster the problems placed before us and to introduce the solutions more rapidly into practice. The more economically we work and the more strictly we adhere to the plan, the more substantial becomes our contribution to the solution of the main economic problem and the attainment of the goals of the Seven-Year Plan.

A prominent place in the solution of the problems of the textile industry is the following unique and hardly surpassed world-renowned institute.

The Karl-Marx Stadt Research Institute for Textile Technology

This institute was founded in 1952 and completed this year after an investment of 10 million DM. Equipped according to the latest ideas, it contains--besides elaborately and richly appointed laboratories for physical and chemical textile research in its technical institutes for cotton and wool spinning, weaving, knitting, and refining--all modern machines and equipment for large-scale technological process research.

Of the present personnel of 356, 95 are scientific workers and 144 are technicians.

The main emphasis in the cotton-spinning section was and continues to be the development of processes to increase labor productivity and improve quality. Investigation of the spin-

ning conditions in the various types of stretching devices (Streckwerksarten) on the wool-combing machines in the cotton spinning mills led to a redesigning of nearly all wool combing machines with two-roller, one-zone stretching devices. For the redesign of existing stretchers, the four-roller two-zone delay distribution was tested and it was recommended that the industry introduce it as well as to the machine plants for production; for the new construction, the three-over-four roller stretchers, two-zone warp distribution was advocated. With these changed stretchers and the likewise tested diagonal pull-off on wool combing machines, band reuularity was considerably improved and the speed output of the stretchers was increased. A saving in labor and costs was achieved by applying the method of using only one stretcher and flyer passage in spinning rayon fibers.

The machine building industry developed a narrow ring spinning machine which was found to be very suitable for the reconstruction of the cotton spinning mills and, accordingly, recommended its introduction. Comparative tests with spring pressure shafts and swing pressure shafts on the draw frame of the ring spinning machine became leading examples of the machine building industry. The testing of all-steel fittings in the institute led to the successful completion of the development work in the people-owned industry.

Research on the influence of the cleaning machines on the fiber characteristics led to discoveries on the arrangement and combination of the picking units and their arrangement. The number of hops [Nissenzahl] and the number of noils in carded or combed assortments were lowered and the flow characteristics improved.

The second emphasis of the work, the spinning of synthetic fibers, was given to the processing and machine-building sections of the industry to solve the problems of polyamide and polyester fibers, pure or mixed with cotton and rayon. Mixtures of polyamide fibers with cotton and 20 percent constant rayon led to flow conditions of highest spindle revolutions.

Wool research was assiduously pursued in the wool spinning section. In the development of chemical and mechanical technology of coarse wools, such as the Soviet, Mongolian, and Chinese mixed wools, source studies were conducted; Syrian and Turkish wools as well as Soviet semi-coarse wools were studied in order to establish their characteristics

and composition, so that imports and utilization could be determined; research in the fineness and longitudinal composition was conducted with the aim of separating, by mechanical means, the fine fibers from the coarse ones. At the present time debristling methods are being tested on double carding combs for combed wool. The chemistry of the natural colors was investigated and a quick-bleach process based on a formaldehyde treatment with intensive hydrogen peroxide after-treatment was developed. In comparison to fur bleaches, the new technique is appreciably shorter and can be applied continuously on the combed materials. The wool fiber is being better preserved.

The color behavior of coarse bristles and dead hairs was studied and a method for determining the pulp content of wools developed.

Investigation concerning the importance of residual fats in the properties and the fabrication of wool revealed functions of expansion, workability, elasticity, and absorption, depending on the fat content of the wool and the direct relations of the fat content and water content to the elasticity.

As there was no practical experience regarding these changes in wool, this field was investigated thoroughly. Wool combings were modified with various chemicals and the chemical and mechanical properties of the modified wool were studied, especially its resistance to humidity and microorganisms. Parallel with the experiments in the laboratory, technical tests were made in industry. The work was continued with research on finding a rational process for anti-felting.

Chemical and technical fiber studies on types from Saxony, Anhalt, Thuringia, Mecklenburg, and Brandedburg to establish the maximum spinability of the German wools were undertaken with the aim of finding their best utilization in the worsted industry and in order to supply the sheep ranches with ideas on proper breeding.

The Australian findings regarding the aging of wool combings were confirmed and supplemented by our research. It was proved that wool combings should be stored a minimum of 30 or even 50 days between combing and spinning.

A comparative study of the standard ring spinning machine--2201-K "Moving Spindle Bench"--and the combed yarn ring-spinning machine--K 5 "Moving Ring Bench"--proved the superiority of the well-known ring spinning over the "Perfect system" in the worsted section.

The question of the use of synthetic fibers with the combed yarn, short-spin method, which has proved itself with rayon fibers, has been dealt with in a number of experiments, and it was proved that especially mixtures with wolcrylon, lanon and pece regenerated fibers can be advantageously spun.

In weaving, the focal point lies in the rational formulation of well known and the development of new techniques, especially for the use of synthetic fiber materials. With the aim of finding the "maximum spool speed, optimum thread-tension," research was done on the preparation for weaving, and it was found that, with point-shaped pull-off accelerators on warp spooling machines, the roll-off speed could be increased by 20 to 30 percent. Thread brakes independent of thread speed on the creel and warp frames improved the quality of the beams and the efficiency of the weaving mill. These results are the basis for new designs in machine building.

The completion of research on the dressing of synthetic yarns allows the weaving of nontwisted warp yarns, the reduction of the tension weights for fabrics, and a saving in twist capacities. The solution of the problems of full-width dressing of polyamide silks in the central research and development departments for silk fabrics in Greiz makes possible the weaving of polyamide silk with low-twist, saves twist capacity, and results in fabrics with low transparency and greater softness.

In cotton weaving the tension weights were reduced and the quality improved, the spindle revolutions being 10 percent less.

The Malimo technique allows even today outputs of 120 to 130 meters of toweling per machine hour. It was developed by the machine building industry, and the practical application for coarse yarns and Vigonne products was worked out in the FIFT [not identified].

Wool weaving: The production costs of ladies' and men's topcoat fabrics by the Skelan method of the FIFT, as contrasted to that of similar fabrics, are 50 percent lower, with 20 to 30 percent less material used and a ten-fold higher productivity. At present the output is 40 meters per machine-hour. The wearing characteristics are satisfactory; 900,000 square meters of material will be produced in 1960. This technique alone results in a profit of 10 to 12 million DM. In 1959, several hundred thousand square meters of suit and dress fabrics with good wearing characteristics made of wolcrylon and lanon mixed yarns will be produced. This was made possible by the cooperation of the FIFT and the Central Research and Development Department for Worsted Fabrics in Gera. The mixed combed yarn fabrics of synthetic wool and synthetic fibers led to an improvement of the quality and a reduction of weight.

Silk weaving: After establishing the sources of failures in polyamide silk, suggestions were made to the chemical fiber producers as well as replacements for the TGL [not identified]. Rules for admissible thread tension on synthetic silks led to the improvement of quality and decrease in costs. The FIFT tested optical and electrical spool control on silk power looms, thereby improving the quality and increasing the productivity.

Carpet weaving: New techniques are in the foreground, such as carpet manufacture on the double-rib loom, a coproduction of weaving and knitting [of] the FIFT, and the corresponding research and development department of the industry. At present, rebuilt machines produce 17 square meters per hour, whereas new machines will produce 75 square meters per hour. A boucle carpet power loom produces 3 to 4 square meters per hour. This year 100,000 square meters will still be produced. Research on producing carpets by the gluing and sewing methods has begun.

Curtains, Furniture Fabrics, Plush: Research on curtains and embroidered tulle in the Central Research and Development Department for Curtains and Lace in Plauen has been completed. Production with higher yields and lower costs has begun. The planned production of woven pelts made of synthetic fibers for topcoats and fur linings made of prelana has been proceeding since 1958; the development of polyamide and polyester fibers is completed; production can start immediately after delivery of fur-type fibers.

<u>Textiles for Industrial Purposes</u>: Since 1958, paint roller plush based on a method of the FIFT has been produced; in 1959, 200,000 paint rollers were produced; the result has been a saving of several million DM. Runner cover fabrics made of wolcrylon, developed by the FIFT, have proven to be very durable--in 1959, 50,000 square meters were produced. Sieves for pulp machines made of polyamide wire and woven felts of synthetic fibers are proving their worth in paper production. They were developed by the Research and Development Department for Sieves and Felts in Rodewisch. Filter fabrics made of synthetic fibers are being successfully used by the sugar, chemical, and ceramic industries (FFIT and the Central Research and Development Department for Bast Fibers in Dresden). A cord of lanon developed by the FIFT for filtering hot boric acid allows the introduction of continuous processes in the chemical industry.

In the sphere of knitting, the development of techniques for the utilization of synthetic fibers and the application of rational work methods wtand in the center of activity. A constant improvement in quality was achieved by using polyamide silk or parts thereof in the production of underwear. More rational methods of fixing polyamide silks and mesh fabrics replaced more primitive methods. After establishing the ratios of mixtures of synthetic wool and cotton, the flow characteristics of the yarns and the quality of the underwear improved; thread breakage in the spinning mill and after-treatment was decreased. In addition, cotton is being saved. After successful completion of development, mass production of underwear for rheumatic patients--vylan--was commenced. In the processing of two- and three-thread fibers for stockings, sports overalls, etc., the quality is being improved and material saved. A 25 percent reduction of the tension points in stockings and net materials made of polyamide silk resulted from a determination of the optimum twist. After investigating hot water fixing, the more rational post-boarding method was introduced in the stocking industry. Through a newly developed edging (Pilling) test apparatus, time will be saved in durability tests. A corresponding edging evaluation method creates definite ideas for the degree of edging. Continuous manufacturing control of wolcrylon is the basis for mass production in the industry.

For the Malimo technique, the first machine from the zero series was broken in and, together with the weaving department, a series of technological steps for production in the industry were worked out. The difficulties in production time

were collectively overcome together with the Research and Development Department for Underwear in Cranzahl. The technical personnel was acquainted with the Malimo technique in preparatory courses, which were also attended by specialists from other branches of the textile industry that will begin applying the Malimo technique in the foreseeable future.

As a result of the "investigation of the causes of residual shrinking of net and net knitting," tension width tables and coefficients for the equipment are now available. Better residual shrinking values are being achieved and the quality improved. Besides, the standardization of knits is being facilitated.

With the investigation of all technical factors in knitting which may influence the properties of knits, especially those of synthetic fibers, an optimum of processing data is being striven for. After completion of this work, it will be possible to get processing data for knits by means of calculations.

Research on "infrared fixing" is investigating the infrared fixing of knits. Infrared lamps were used to find the necessary fixing temperatures. These experiments proved that, because of the unequal radiations, the intensity within one lamp, and the turbulent air currents in the fixing apparatus, a homogeneous temperature field could not be achieved. The work concluded with the statement that the fixing of knits by means of infrared radiations in the present stage of development cannot produce the desired effects.

In the finishing department, continuous processes for dyeing and bleaching are being developed. Compared to the present techniques, a continuous process can considerably increase productivity. The sodium chlorite, full-width bleaching methdd with acid salts as activators was capable of considerably reducing the corrosion of the materials and the harmful formation of chlorine dioxide. A continuous bleaching method for linen fabrics and--with the research and development section for Vigogne spinning in Werdau--a continuous flock bleaching installation were worked out. Also introduced were a continuous de-sizing by the Klotz steam method for continuous dye and the continuous dyeing of work twill with Wolfen sulfur dyes. In the case of reactive dyes, the cheaper continuous dyeing methods for Procion, Cibacron, and Remazol dyes were worked out and made known to the industry.

Noncombustible "syntherm" materials for upholstering aircraft, ships, and theaters are being used in rising quantities. The continuous process dyeing of these decorative materials, consisting of dederon and PeCe rayon fiber, is being carried out to a great extent by the industry. Here only PeCe is being continuously dyed and the predyed dederon part is reserved.

Another focal point in textile finishing is the working out of suitable dyeing methods for underwear--round and chain loom products--as far machines and dyeing techniques are concerned. The dyeing methods and formulae for cotton round-knit goods with substance dyes and for PeCe knits (Vylan underwear), with Vialon fast dyes and Remol PC, were turned over to industry.

Further continuous-process techniques for warp knits are expected so that the discontinuous and expensive methods now used will be replaced.

Through pressurization of fabrics made of regenerated cellulose fibers, the steaming time has been reduced from 45 to 5 to 7 minutes.

In the vast field of dyeing and fabric preparation involving synthetic fibers, suitable techniques and formulae were worked out and turned over to industry. To mention only a few: the optical brightening of the respective true colors, the choosing of suitable dye categories for dederon and trelon. For the polyacrylnitril fiber of the Wolcrylon II type, much work has been done in order to overcome the difficulties of dyeing; for Wolcrylon IV, the copper ion method with good light and water resistance--for knitted garments--has been introduced. For the dyeing of garments and fabrics, the suitability of metal-complex dyes is being investigated.

Research in the relationship between fine fiber structure and optimum fixing conditions with polyester fibers led to the method of determining the optimum fixing conditions and degree of fixing by means of iodine absorption.

The Thermosol process proved to be suitable for printing on lanon rayon fiber fabrics. Also successfully completed were investigations of the dyeing of reclaimed textile fibers with components of synthetic fibers, such as dederon, Wolcrylon II, prelana, lanon, and PeCe.

An important role is still being played by the superfinishing of regenerated cellulose fiber fabrics. New potentialities of catalysts with synthetic resin treatment on a base of dimethylurea and trimethylol melamine were investigated.

New trails were blazed in the field of fire-proofing. A newly developed product allows the fire-proofing of work clothes combined with wash resistance. The chemical industry received the formulae, the textile industry the methods procedure. Furthermore, a process was developed for fire-proofing decorative fabrics with another product based on an organic phophonium compound which does not dull fabrics and prevents scorching.

The chemical industry, after receiving suggestions from the FIFT, enlarged its variety of chemicals for waterproofing, soften, and antistatic treatment.

Great possibilities lie in fleece-fabrics strengthened by synthetic resins. The FIFT developed a technique for the production of the Floretta fleece fabric, which has been in production for two years in a temporary experimental plant. Tow continuously working plants will commence mass production in 1960 of elastic flannel lining material. The productivity is nearly twenty times as high as with the old methods. A saving of 12 million DM is expected.

A variety of promising and productive applications is offered by layered products. By the use of isocyanates obtained by the VEB "Wolfen" Factory for Dyes, adhesive layering on polyamide products is achieved, as well as wash and drycleaning resistant textile glues and impregnating agents. For the garment industry new techniques are materialized by using modified dederon foils. The fabric parts will be joined by being glued together with foil strips rather than by seweing. The newly developed gluing foil, which can be sealed by heat, can also be used for collar inserts in shirts; it can also be applied on double-layered dederon fabrics for the manufacture of flexible containers for the transport of crude oil and its derivatives.

The application of the heat control technique led to the design of hot-air fixing apparatuses with automatic temperature control with the limits of $\pm$ 2 degrees centigrade.

Magnetic clutches for automatic control of finishing machines were developed and the blueprints were turned over to

the machine-building plants with a suggestion to the VEM [Volkseigene Maschinenbau; People-Owned Machine-Building] plant that attachments be introduced for the prevention of breakdowns on stretching machines.

In the field of textile testing in the past, various devices and methods for testing the uniformity of yarns and chemical silks were developed as well as further methods for testing the degree of fixation of polyamide silk. For the still problematic testing of textile sheets and especially flat articles, new rules for routine testing could be set up. Future focal points are the application of the testing to Soviet cotton and its significance for spinning, and the development of devices and methods for Silastic products, for Malimo, Skelan, and Floretta.

In the Department of Research Tool Construction, engineers, mechanics, and textile experts cooperate in the development of special devices and instruments, such as a device for testing tension and expansion of pre-yarn material in the prespinning process. Other instrument development concerned a cylinder pressure measurement gauge for drawing frames; a dynamometer for shuttle-box springs for the exact setting of power looms; a model piling machine; an edging (Pilling) control device; a stocking length measuring device; a device for the attachment of ionizors to the flat loop sinking machine; a special device for loop testing; an attachment for the yarn-strength tester; a device for testing the expansion of flannel yarns; a test head for temperature radiation devices.

In the physics laboratory, special heat elements and resistance thermometers were developed for solving physical measurement problems. Also developed were a radiation pyrometer for automatic control in finishing; for shortening the drying process, a very economical high-frequency drying method; an inertialess recording device for weaving yarn tension on the power loom. Of great importance for making textiles lighter and for solving problems of clothing hygiene is a new developed device for the determination of heat penetration in textiles.

Out of many investigations of electrostatic charges during textile processing, a high-tension peak ionizor was developed for practical application; further methods and devices for determining "antistatics" were devised and other research deals with the electrostatic fiber parallelization in fleece.

In the isotope laboratory erected in 1958, work was done on problems of the application of nuclear physics to textile research, such as radiation measurement, testing with radioactive soaps, radio-autographic studies in the distribution of auxiliary textile materials on textiles; radioactive area-weight measurements, and especially uniformity tests of spinning bands and roves.

The biological laboratory dealt with problems of clothing hygiene and physiology, such as investigating and determining the complex influences of clothing on the bodily functions. The improved pocket thermo-hygrograph allows systematic investigation and control of the comfort zones, such as the worker in his work clothes and underwear. Discomfort caused by clothing can reduce the productivity of the wearer if it does not completely hinder his activities. The basic points in this field of research deal with the investigation of the climatic conditions of clothing while working under various conditions; with measurements of heat penetration and perspiration conveyance in fabrics and textures; ultraviolet penetration through various textiles; and mycological and bacteriological investigations of various textile-chemical equipment. Future research will deal with the hygiene of footwear, especially with stockings made of synthetic fibers and the textile influences on the cooling-off coefficient.

Experiments with belts made of polyamide cord silk instead of leather on top-belt power looms led to the valuable result that belts of polyamide cord silk, at least in light power looms, achieved a running time three to four times higher and should therefore be immediately adopted instead of the leather belts. Since the advantages of such belts have been tested in practical application, they are now being preferred in cotton weaving. Suggestions for the installation of the belt in the power looms have been submitted.

<u>Metal Yarns</u>: A process for the protection of the customary metallic fabrics against oxidation, such as fashionable fabrics, bands, etc., in the braid industry, as well as an installation for application of this method have been developed (DWP [possibly Deutsches Wertpatent; German patent] Application WP 75c/51583). Metallic yarns so treated--unlike the normal metallic ones--even after a one-year exposure to normal climatic conditions, show no traces of oxidation. Even a very good resistance to sea water, which is very important in military uniforms, could be proved.

In the economic field the research and development projects are being analyzed and evaluated in regard to their profitableness. Other investigations of a more basic character deal with automation, specialization, cooperation, and with questions of rationalization and mass production. The Bureau of Standardization in the FIFT deals with standardization questions for the whole industry.

The entire textile literature of the world is being evaluated by the Department of Documentation in cooperation with the Institute for Fiber Research, the Institute for Textile Machines, and the Institute for Textile Technology of Chemical Fibers. The results are being published in the documentation service, Fibers and Technology (Faserstoffe und Textiltechnik). Other widely-distributed publications are the Textilinformationen and monographs on the perennical problems of the textile industry. Many foreign and domestic publications are constantoy reporting about the work of the institute.

As the leading institute, FIFT participates in an advisory capacity in the work of the 21 research and development departments of the industry.

The technology of bast-fiber treatment, which is dealt with in the FIFT, is being researched by the Central Research and Development Department for the Bast-Fiber Industry, which was founded in 1954 and is being directed by Dr U. Liebscher. It cooperates closely with the Institute for Technology of Fibers in Dresden, in whose premises it is located.

Greater projects deal with the introduction of aerobic steeping to reduce the steeping time by 50 percent. Poor working conditions in premises with wet-spinning are being improved by the method of cold-spinning wet flax yarns. Continuous process spooling was achieved by the cross-spool setting of wet-spun linen yarns, thus lowering the cost by one DM per kilogram of linen yarn. Together with the FIFT, such problems as the full-width bleaching of linens, a process for making linen wrinkle-proof, and a method for evaluating winnowed flax by apparatuses were solved.

For the utilization of chemical fibers the following work was done: spinning of cables on jute spinning machines; technical fabrics of polyamide-polyacrylnitril fibers; concealed and layered fabrics for packaging and sacking; and fish nets of polyamide wire. For all these applications, chemical fibers gave better performance and greater or smaller savings in costs and imports.

The field of ready-made clothing is being treated by the Research and Development Department for the Clothing Industry in Berlin--directed by H. Jaehnig, clothing engineer--in close cooperation with the German Fashion Institute. The many-sided development program of this central research department contains, besides elaborate body measurements which will reveal growth conditions of the population of the GDR, problems of mass production, inter-factory transport; problems of the optimum solutions of the question of fleece production; and mechanization and semi-automation of the sewing process. New sewing processes with changed characteristics are being developed.

The problems of children's and women's measurements, which are presently under study, will be concluded in 1959 with a new program of sizes. By continuing measurements and their evaluation, it is planned to create a new size program for men by 1961. Eighty-five percent of the population of the GDR will be supplied with well fitting, ready-made clothes after completion of these studies.

Good results were also achieved in mechanization and semi-automation of clothing production. Here the cooperation between clothing technicians and machine engineers has proved valuable. By changing and adapting existing techniques of clothing manufacture, a great number of possibilities of mechanization of single and multiple operations are available that will increase productivity. On the basis of these principles, the "assembly line for men's trousers" thus developed is in the process of practical application. For the first time in the framework of this special field, control technique is being applied on clothing machinery.

The new gluing technique is presently being developed. In cooperation with the FIFT, which is solving the glue question, revolutionary techniques and new machinesd will be created. Significant for this gluing process is the possibility of cutting and joining clothing parts in one operation. A good starting point for the present development are the Soviet research achievements and experiences which are made available to us by the Moscow Institute for Clothing Technology.

Institute for Textile Technology of Chemical Fibers in Rufolstadt-Schwarza

Many industries are necessary for the creation of a high-quality, modern textile product; a great number of research and development establishments for systematic research are needed to produce the best chemical fibers with the best textile machines for the production of the most suitable and most beautiful textiles. Here the Institute for Textile Technology of Chemical Fibers assumes a special position, as its name signifies. For chemical fibers to be properly developed, a link between the chemical fiber and textile industries is needed. This task has been taken over by the Institute for Textile Technology of Chemical Fibers in Rudolstadt-Schwarza. It was previously a technological department of the Thuringian Synthetic Fibers Plant, and thanks to a decree of our progressive government--which is furthering technical progress-it was established as an institute on 5 July, 1954.

The institute has the following departments:

1	Management	1.1	Textile Laboratories
1.01	Documentation	1.11	Textile-Physics Laboratory
1.02	Standardization	1.12	Textile-Chemistry Laboratory
1.03	Techniques	1.13	Wear and Tear Laboratory
1.04	Textile Cleaning	1.2	Textile Technical School
1.05	Wearing Experiements	1.21	Fiber Processing
1.06	Administration	1.22	Silk Processing
		1.23	Textile Finishing

One year after the foundation of the institute, the government approved a large construction project to house the 300 employees of the institute, thus creating favorable conditions for work. At the beginning of 1958, the laboratory building, 80 x 16 meters, of four floors, was completed. The over-all project should be completed by 1963, with a finished space of 66,000 cubic meters, including a textile technical school.

The main task of the institute is to perform research and development work. Approximately half of its capacity is assigned to this purpose. Every year 20 to 25 problems are dealt with. The following are included in the central plan for research and technical development, indicating their great scope:

Tire cord: One of the many-sided problems still to be solved in order to obtain tires of higher quality were discussed in last year's conference;

Polyester Fiber Materials and Polyacrylnitril Materials: These tasks are closely connected with the chemical program. Their aim is to control quality by prompt laboratory and manufacturing tests, so that mass production may turn out optimum fiber materials. These tasks can be solved only in close cooperation with the chemical fiber plants. Further central research themes are: polyamide fibers and silks, reconstruction of synthetic wool and rayon, as well as PeCe fibers.

The plan for research and technical development of the central organs includes many other themes, which can be broken down into the following groups:

Optimum Spinning of Chemical Fibers

By developing jets for spinning of profile, hollow profile, and hollow fibers and by the chemical solution methods, synthetic threads with toothed or notched surfaces were produced, which, as proved by measurements and tests in textile spinning mills and wearing tests on their products, displayed better properties than the original smooth-surface synthetic fibers. In the meantime, these developments were realized in mass production and are being watched very closely by foreign countries.

Always topical in this research complex is the technological testing of chemical fibers with the aim, on the one hand, of influencing their production and appearance so that the textile expert can obtain raw materials which he can manufacture without any difficulty; and on the other hand, to improve textile processing by new processes and machines. In connection with this, the qualitative evaluation cannot go on without general processing control. The institute is especially committed to the field of tile testing. Methods and devices, especially with dynamic stresses, are being developed not only for technical textiles but also for the evaluation of clothing textiles. In the center of interest stands automation and the aim of supplementing the wearing tests by testing devices, since up to now the former was the only means of determining the use value.

Besides these research tasks, the institute has many administrative tasks. Jointly with the Chemical Fiber-Works, it works on such problems as optimum fiber appearance, curled synthetic wool, uniform preparation, avoidance of defects in synthetic fabrics, introduction of statistical methods for the TKO [possible, Technische Kontroll Organe; Technical Control Organs] tests, uniformity of plant laboratory tests, coordination of the TKO activities, textile technological consultation, etc. A sizable portion of the work of the institute is devoted to consultations and investigation for third parties. The documentation section not only satisfies **its** own needs but also those of other interested parties, predominantly in the GDR, by means of studies in certain fields, books and periodicals, translations, and photostatic copies.

The results of the institute's research are being published in the quarterly publication Mitteilungen, which is now in its third year. The institute has published 47 original reports in technical periodicals besides scores of minor constributions.

The conferences reflect the scientific activities of the institute and at the same time stimulate further research. This year 27 subjects will be discussed, of which seven will be by foreign experts. Extracts of these conferences appear in Mitteilungen. There are also lectures by members of the institute.

The above sketched activities of the institute have had an effect not only in the GDR but also abroad, in connection with scientific and technical cooperation with friendly nations. Representatives of the institute participate in annual meetings and congresses.

German Academy of Sciences, Berlin: Institute for Fiber Research in Teltow-Seehof

The ten sections of this institute founded in 1949, whose scope embraces mainly the problems of high polymers, their synthesis, structure, and spinning,[1] have altogether 320 members of whom 46 are scientists. The government has spent 6 million DM for expansion and new construction of buildings. Only the textile testing and finishing section with 32 workers--six of these being scientists--are engaged in textile research and development.

The sector for textile finishing, while working on the problems of soiling of Bobinet products of dederon by graphite, discovered a practicable process (DWP 10301). About 100 different aromatic and hydro-aromatic compounds were tested for their effectiveness as carriers in the process of dying polyester fibers with dispersion dyestuffs. Exceptionally suitable for practical application proved to be acetales of cyclohexanone (DEP 12915) and formale or acetates of phenoxyethanoles (Patent Application WP 8m/53489). The dyeing capacity of polyacrylnitril fibers can be extraordinarily raised with anion dyes if we treat them with hydroxylamine (DWP 13439). In extensive dyeing experiments on wet-spun polyacrylnitril fibers, valuable insight was gained into the dyeing mechanism of these fibers.

Other work was related to antistatic compounds. A special group was engaged in examining the fire-proofing of cellulose textiles by modification of the fiber while retaining its fiber characteristics. For the respective technical processes, patent protection has been applied for (DWP 15357-Application WP 8k/46013).

In a series of experiments, the physical basis of textile characteristics was established while being tested, and the regularity was fixed in mathematical forumlae; the new findings were utilized in innovations, improvements, and the standardization of testing methods.

The following experiments may be singled out:

In investigating the bases for the creasing of textiles, a law was discovered concerning the time elements in uncreasing, showing two stages in the process of uncreasing: the momentary resilience and the elastic after-effect, which many be computed, being directly connected with the degree of elasticity of the extensive-elastic behavior. These results were incorporated in the technical standard DIN [Deutsche Institute fuer Normen; German Institute for Standards] 53,890: "Measurement of Creasing Recovery Angle."

In investigating the formation mechanism for electrostatic charge, it was discovered, among other things, that the same fabrics become electrostatically charged owing to a "surface effect," and that when a fiber is torn "rupture charges" may arise due to ionization when the molecule chain is broken. As a result of such investibations, measures were taken to prevent such charges.

The theoretical basis of the bursting strength test were examined mathematically in several experiments and exact formulae for the computation of the great tension and extension arising in bursting strength tests were developed. Other theoretical studies related to the exactness of viscosity measurements of solutions of low concentration and the determination of minimal viscosity concentration functions; the development of a computation with exact values for the evaluation of retardation tests with the help of a Kelvin-Voigt model consisting of three elements; and a system of dynamic testing. The last named study has given proof that of 149 possible test procedures, a logical restriction to 46 was suitable and necessary for standardization.

Several studies of an experimental nature have shown the connections between properties and the radius of action.

Systematic investigations on abrasion resistance have shown the regular connection between stress and the mean abrasion coefficient.

In view of the large climatic variations of the populated parts of the earth, comprising a temperature range of 100 degrees centigrade and a range of relative air humidity of 80 percent, one must also consider the reversible property changes caused by the environment in testing and particularly in the estimation of use values of textiles. There was a thorough examination of the influence of low temperatures on the tensile strength, extension-elastic behavior, and bending strength of experimental fabrics from the most important natural and synthetic fibers as well as ungummed and gummed cotton lining fabrics for rubber conveyor belts; it was established that all fibers, with the exception of cotton and linen, increase in a linear manner in their resistance while their extension decreases with falling temperatures.

Other extensive investigations on the reversible property changes of textiles due to climatic changes and on irreversible changes due to photochemical decomposition are in the process of completion.

From investigations on the influence of air pressure on test results in suspended matter, air-meters brought about an improvement in the testing apparatus for the determination of air permeability. Testing for the effects of swelling and swelling elasticity of fibers led to the development of an objective test procedure. There was likewise an improvement

in the testing standards by way of tests on the influence of the moisture content of the air on the residual moisture content of fibers for the determination of the dry weight.

Comparative investigations of testing apparatuses or procedures brought new knowledge on the relationship and convertibility of tensile and bursting strength as well as the resistance of single and multiple fibers; on the not to be neglected influence of stylus friction in tests of tensile strength of single fibers; and on the hygrometrically more favorable absorption quality of dederon for steam as compared to human hair. The differences found with the Freha and Barmag apparatuses on the traveling thread in testing for yarn uniformity were investigated and its unavoidable causes looked into; a new uniformity test procedure was developed on the optimum basis. Extensive investigations of tests for the thickness of fabrics and the compressibility of textiles resulted in a new design of frictionless calipers (DWP 14,904; DBP 932,934), whose principle as well as the regular relationships discovered were incorporated into DIN 53,855.

Other studies have been concerned with nomenclature for fiber length measurements and with questions of statistical evaluations of the results of tests and of radioactive isotopes in textile technology.

German Academy of Sciences in Berlin: Dresden Institute for Fiber Technology

This institute, founded in 1950, works closely with the Institute for Textile Technology. Both of them owe their purposeful growth to their former director, Prof W. Frenzel, winner of a National Prize. The present director of both the academic institute and the textile institute of the Technical University if Prof W. Bobeth.

In keeping with its aims as an academic institute, the Institute for Fiber Technology, comprising a personnel of 118, of whom 20 are scientists and 63 technicians, treats basic problems and objective research. More and more, problems of machine technology and measuring data for chemical fabers are being treated. In keeping with the requirements of gauging and regulating techniques in industry, a new emphasis on "textile gauging" has been developed. Two other main pillars are the entire technology of bast fiber process-

ing from fiber production to finishing, as well as the problems of the production and finishing of the glass fiber section.

For many years there has veen systematic work on the improvement of fiber production. Aerobic steeping was developed ti the practical stage and tested in industry. Research into the improvement of the mechanical fiber preparation led to optimum fiber yield methods with the highest care of the fiber. In assuming the main and control tests for the plant grower, close linkage with flax growth is assured. In the sector for flax spinning, work was done on the hackle machine, a modern drawing frame, and centrifugal spinning as well as drying problems.

The combination of acid chlorine-sodium chlorite was found suitable as a bleaching process kind to the fiber, while peroxide-sodium chlorite was found best for fine yarns. An improved finishing process protecting the fiber against decay and bacteria means that considerable national assets could be preserved.

In the area of spindle research, the various advantages and disadvantages of different types of spindles, such as suspension spindles, Freund spindles, various pot spindles. driven ring, self-lubricating ring, etc., could be worked out and compared. With a specially sensitive spindle-testing device, the travel properties of spindles may be pursued to the minutest detail. This instrument is provided for both the spindle manufacturer and for the surveillance of the spindles in production.

A novel spinning process, the decordator spinning process for staple fibers, was developed in the institute and tested as well as a new technique for glass fibers, leading to semi-glass silk which, in quality and price, is between glass silk and rove yarn. It also cooperates in the technical problems of glass silk plants which will be built in the GDR. For this, a glass silk installation is at the disposal of the institute. In addition, there are preparatory studies on twisting, spooling, shearing, finishing, and spinning of glass fibers.

The great use of glass fibers in the synthetics industry makes it necessary that extensive development studies be carried out on the finishing of glass fabrics. Here suitability for lamination in connection with modern plastics is

paramount. The question of the aging of glass fibers is likewise studied.

Processes have been worked out for the identification and proof of fixing effects on synthetic fibers, on the basis of microscopic studies. For the first time, the compression behavior of fibers was thoroughly studied after the elaboration and testing of suitable gauging methods and fine measuring apparatuses. The experimental thread as a means of learning about stresses during processing--particularly spooling--became a solid constituent of textile measurement technique.

Other technical test studies dealt with the development and testing of an improved turn counter, abrasion meter, and a quick rupture apparatus as well as further development of the extension test on the running thread and bast fiber testing. The foundation stone for the introduction of statistical quality control in the textile industry was likewise in the Institute for Fiber Technology.

A very important economic development was the processing of flax and hemp chaff, which previously had been used mainly for burning, into valuable construction and carpentry sheets. This contributes basically to the economic improvement of the bast fiber industry and lumber requirements. The industry has been guided by the institute in the construction of the required plants.

In the Institute of Textile Technology of the Technical University of Dresden, the emphasis is on instruction. Therefore, only few of the personnel of 23 of the institute--eight of whom are scientists and 12 technicians--are available for research. Aided by the regular studies and disserations of the student body, basic scientific studies are currently pursued in keeping with a circumscribed research program. Favored by the dual functions of the director, there is very close collaboration with the Institute for Fiber Technology concerning installations and instruments as well as the problems treated.

The Institute of Textile Technology has stood out especially for tests and measurements on spinning machines (problems of spindles and draw frames), power looms, and knitting machines. It has always collaborated in the field of technical textiles, such as tire cord and conveyor belts. Also extensive has been its research on textile testing in

which new instruments and processes were elaborated. By tradition, it has always pursued microscopic studies, the institute having recently acquired an electron microscope.

(Advanced School of Machine Building) in Karl-Marx Stadt: Institute for Textile Machines

Director: Prof Neumann

This institute is still under construction and in recent years was occupied mainly with regular instruction. Nevertheless, studies on thread breaks, shank machines, and special gauges for finishing machines were successfully concluded.

Institute for Textile Machines, Karl-Marx Stadt

Director: Kunze, Engineer

The specialists and designers of textile machines have the task of creating high-performance textile machines, This requires that previous empirical methods be set aside and that the scientific findings for the development of such machines be used more than ever before. The introduction of scientific methods in textile machinery construction could not be achieved without a scientific center for technical ideology which determines the creation of new machines. That is, it points out the system of development and goals, organizes it, and gives the scientific bases for the development of new machines. It was on this basis that the Institute for Textile Machines was founded on 1 January 1957 in the industrial sector of textile machine construction.

Aims: Direction and administration of all research and development studies in this branch of industry; basic technical construction and fabrication studies for textile machinery construction; investigation of machine parts and mechanisms for construction data; elaboration of very difficult development plants; execution of pioneer studies; dynamic studies on textile machines; testing of construction models; preparation of draft studies and technical-scientific requirements for innovations; permanent analysis of technology and its documentary appraisal; preliminary testing of patent applications; determination of developmental principles of textile machine-building. At present the institute has a

personnel of 160, of which 45 are scientists and 85 are technicians.

In the sector for machines for natural and chemical fiber production, basic studies are carried out on the yield increase of well-known machines and the development of new spinning techniques. The work on the design and use of a centrifugal spinning machine will result in the creation of a model machine for production testing. The use of this machine will guarantee a higher yarn production per area unit on the basis of the large number of spindles obtained. It is especially emphasized in this study as well as all others that there should be no lowering of quality with the higher yields.

The studies for the development of a curling twisting machine for synthetic fibers have been successfully concluded. Further studies deal with the elaboration of a high-performance cotton combing machine in which the comb sets are set from 95 to about 150 min^{-1}, as well as the yield increase in board carding and the automatic warp control for control drawing.

In the field of weaving-machine building, investigations are being carried out on stress and design of loom mechanisms. Under the guidance of the section for weaving, the Neumann type grip-shuttle power loom is being further developed. Special stress is being placed on the completion of the automatic cotton loom TES [not identified]. With the completion of this important developmental plan, the products of the loom sector will gain world renown and become a leading light.

In the "stitched stuff and knitting machine" sector, scientific studies are being carried out on kinematics. Research on yield increase and extension of the use area of knitting machines play a great role in these studies. Of particular importance also is the study of the use of pointed needles for round knitting machines for ladies' stockings, which saves the importation of still necessary latch needles.

Important progress in the developmental program is represented by the sewing-knitting machines of the so-called "Malimo" technique. On these machines fabrics are produced by over-sewing of the warp and weft threads. The ingenious design of the machines and the rational technique introduced afford yields of 120 meters of fabric per hour. The

peg count of these machines is 1,300 per minute; 4,200 weft threads can thus be worked in.

Production on this machine, developed by Mauersberger, a member of the institute and a winner of the National Prize, has already been crowned with great success. First on the list of products are towels which are distinguished for their great absorbency and good rubbing effect. The investigations on the uses of this new technique are not as yet completed. It can, however, already be said that it will be applied in many fields of fabric production, particularly technical fabrics.

In the series of sewing-knitting machines the Mali wadding machine for the over-sewing of wadding layers, designed many years ago must also be counted. The flat fabrics produced on it have found favor as linings for work and outer clothing, insulation material, and as underlayers for the production of artificial leather, linoleum, and carpeting.

Another variant of this developmental series is the Malipol machine with which pile naps are sewed in on an existing basic material. By means of a suitable after-treatment, such as concealing with fixed stitching wadding or layering with OVC, the material is used as carpeting, upholstery for homes, offices, etc. Of note is the high yield of this machine, which, in continuous operation, gives 1,300 stitches per minute; thus with a stitch length of 2 millimeters it does 2.6 meters per minute.

In the realm of textile finishing machines, the emphasis at the present time is on basic investigations and leading developments in the field of dry techniques. Of particular importance is the development of a high-performance cotton warp steeping machine and a silk steeping machine. For the automation of the dry machines, a humidity gauge and regulation apparatus with a capacity measuring instrument was developed. Of interest here is the fact that this instrument is not adjusted for the dry technique in the textile industry but is used in the production of briquettes and construction materials.

As a contribution to the solution of the washing problem, a continuous-process washing machine is being developed.

In the sector for ready-made clothing leading studies and investigations are being conducted on the automation of sewing machines.

In the field of dynamics and drive technology, there are studies on dynamic tests and technical power problems on textile machines.

In conclusion, one should point to the studies in the sections for standardization, Leit-BfE, and documentation, which have a favorable effect on the development plans and production process in the plants. Worthy of special mention here are the economically very valuable standardization studies for the rationalization of production.

German Academy of Agricultural Sciences in Berlin: Institute for Research on Animal Breeding in Dummersdorf

Director: Prof Stahl, Holder of National Prize

Scope of Sheep-Breeding Department:

Work on problems of wool production from the breeder's viewpoint; improvement in wool yield as to quantity and quality; elaboration of the process for the treatment of the wool before, during, and after the shearing.

The emphasis of the research is in the direction of fine wool production. However, as an increase in the wool yield of the entire sheep population in the GDR is one of the most important problems, a sheep herd comprising all the different breeds of sheep in the GDR was brought together for this purpose in Dummersdorf-Pankelow. Research studies dealt with the influence of the surrounding conditions on the type and yield of the sheep, with special consideration of the quantitative and qualitative production of wool; the correlation between fold formation and wool yield; hide thickness and wool thickness and their influence on wool yield; and problems of the production of longer wool.

Technical University of Dresden: Faculty of Engineering Economics: Institute of the Economics of the Textile Industry

Director: Dr K. Schille, Textile Engineer

Scope: Investigation of the general economic problems of management, organization, and planning in the textile industry, and the special economic problems of the organization and planning of the people-owned textile industry.

In this institute some problems of the economic evaluation of technical research studies have been solved. particularly concerning the new techniques, such as Floretta, Malimo, Skelan, the economical use of synthetic fibers, etc.

In the field of economics, the following studies were carried out: bases and methods of operative production planning in the plants of the people-owned textile industry; elaboration of a method for the determination of the production capacity of textile finishing plants; basis and methods of the organization of the technical and technological preparation of production, including the economic evaluation of technical variants; elaboration of management methods and management structure in the textile plants; investigation of the economic results of standardization in cotton weaving plants.

* * *

The research and development studies briefly sketched here are meant to give only a survey of the developmental outlines and are intended to show what has been achieved in the research institutes in a relatively short time from practically nothing.

The many-sided field of textiles, where chemistry and physics, machine technology, and engineering science are closely interrelated and interpenetrating, can be successfully mastered only where there is a division of labor. This is also true of the distribution of studies in the various institutes. On the other hand, the principles of socialist collaboration between the individual research sites must come to the fore even more, if we are to bring our great and wonderful tasks to a quick and successful conclusion. Our government has given all the necessary prerequisites for

this. It is up to us, the workers in the field of textile research, to utilize these possibilities to the fullest extent.

Footnote

Cf. Chem. Techn. 11 (1959) No 9, p 509, H. Klare: "Organisation und Thematik der Arbeiten des Institutes fuer Faserstoff-Forschung in ihren Beziehungen zur Praxis" (Organization and Subject Matter of Research of the Institute for Fiber Research in their Relation to Practice).

Photo Captions

1. (Left) Karl-Marx Stadt Research Institute for Textile Technology. View from the roof of the main building of several machine buildings.

2. (Middle) Karl-Marx Stadt Research Institute for Textile Technology. View of an illuminated technical center reconstructed according to the most modern viewpoints (reinforced concrete--prefabricated construction). The department pictured is the wool spinning department with a three-card machinery unit in the foreground.

3. (Bottom) Karl-Marx Stadt Research Institute for Textile Technology. Textile physics laboratory.

[Caption to all three photographs]: Karl-Marx Stadt Research Institute for Textile Technology; Director: Senior Engineer J. Walther, Meritorious Technician of the People; Scientific Center of the Textile Industry; development of new, more rational technologies and reexamination of existing technologies in the fields of spinning, weaving, knitting, textile improvement, with the purpose of shortening production operational time, improving quality, increasing productivity, working with the textile machine-building industry in furthering new developments, working out technologies for processing new chemical fibers and clarification of their most useful applications, testing and introduction of new textile auxiliary materials, development of special testing equipment, testing and control methods, working out commodity guides and standards, guidance of research and development centers of the entire textile industry, and counciling of

state organs in determining the technical perspectives in the individual branches of the textile industry, documentation of textile engineering.

4. Karl-Marx Stadt Research Institute for Textile Technology. View of the auditorium.

5. Rudolstadt Institute for the Textile Technology of Chemical Fibers. Partial view of the main building.

6. Rudolstadt Institute for the Textile Technology of Chemical Fibers. Wear-testing department--testing of outer garments (the ironing room).

[Captions to Photos 5 and 6]: Rudolstadt Institute for the Testile Technology of Chemical Fibers; Director: H. Boehringer, Dr Engr; Observation of the physical and chemical porperties of chemical fibers by apparatus measurements and tests of their technical textile behavior, technical textile experimental processing and direct determination of the utilization value of products made of chemical fibers. The quality of chemical fibers are to be influenced indirectly by these activities while they are to be directly improved through the creation of scientific and technical foundations for the development of processes and installations for the fiber-producing and the fiber-processing industries. Additional tasks are the development of method and apparatus for the physical and chemical testing of textiles, the coordination of the testing aciivities of chemical fiber plants, standardization, and documentation.

7. Dresden Institute of Fiber Technology--main building.

8. Dresden Institute of Fiber Technology--main chemical laboratory of the Textile Improvement Department.

9. Dresden Institute of Fiber Technology. Part of the experimental unit for the production of fiberboard from flax shavings.

[Caption for Photos 7, 8, and 9]: German Academy of Sciences in Berlin; Institute of Fiber Technology, Dresden, in personal connection with the Institute for Textile Engineering of the Dresden Technical University; Director: Prof W. Bobeth, Dr Engr habil; quality improvement of bast fibers, roasting processes, new technologies, and quality

improvement of glass fiber materials and their textile processing. In the field of spinning technology, spindle research, centrifugal spinning, development of new technologies and/or partial technologies, for chemical fiber technology, working out centrifugal problems, fiber stress measurements, fixing problems, methods of research and measurement problems in weaving and knitting, working out problems on fibers, surfaces, and materials, cord technology, investigation of thread problems, cord materials, development of new testing equipment and methods, concepts of properties, fiber microscopy.

10. Teltow-Seehof Institute of Fiber Research--partial view of the building.

11. Teltow-Seehof Institute of Fiber Research--laboratory building.

. [Captions for 10 and 11]: German Academy of Sciences in Berlin; Teltow-Seehof Institute for Fiber Research; Director: Prof E. Correns, National Prize Winner; chemical basic research in the field of chemical fiber production with the following areas of work: botanical-morphological investigations on cellulose-providing plants, celluloses for the chemical fiber industry, cellulose regenerative fibers--including acetate fibers, polycondensate fibers, polymerisate fibers with polyacrylnitril fibers as a point of concentration, fine structure research on fibers and high polymers, textile testing and improvement, problems in dyeing of polyacrylnitril and ployester fibers, the electrostatic charging of synthetic fibers and its prevention and the high refinement cellulose regenerative fibers. Textile documentation in the fields of textile testing and improvement.

12. Teltow-Seehof Institute of Fiber Research--partial view of the weather exposure unit.

13. Teltow-Seehof Institute of Fiber Research. A supplementary device developed in the institute for testing resistance to creasing.

14. Teltow-Seehof Institute of Fiber Research. A thickness-measuring device developed in the institute for lightly compressible flat-shaped articles. Left--production series design; right--development model.

1954

EAST GERMANY

Past and Future Development of the GDR Textile Industry

[This is a translation of an article by Otto Lindenhayn, Member of State Planning Commission, in Deutsche Textiltechnik, Vol IX, No 9, September 1959, Berlin, pages 450-456; CSO: 3335-N/d]

The following article describes chronologically the phases passed through by the GDR since the founding of the workers' and peasants' state. This article deals mainly with the results of the development of production, labor productivity, research and technology, raw materials supply, and exports. A prospect of the goals of the textile industry for 1965 closes the article.

Ten years ago, on 7 October 1949, the GDR, the first workers' and peasnats' state in German history, was founded. This historical event has had a decisive significance for the state and the future of the German nation, as the GDR represents the new progressive Germany in which the ideas of Marx and Engels are being realized. The development during the past ten years has been connected with many great successes. During this time the GDR has evolved into a highly industrialized state, which holds fifth place in industrial production in Europe. Because of its solid economic basis and its policy of peace and international understanding, the GDR is a factor in world politics today that can no longer be ignored. The Geneva Foreign Ministers' Conference proved that the GDR is a reality with which one must count.

The development during the past years has again proved that socialism can be built up in an industrial country and at the same time it has given the skeptics who predicted that the GDR would have a short life an unequivocal lesson. Such prophesies did not come true; on the contrary, the young state developed so well and was built on such a firm basis that in 1958 the Fifth Congress of the Socialist Unity Party (SED) decided that the main economic goal was catching up with and surpassing West Germany in per capita consumption of all important consumer goods by 1961. In this peaceful competition with West Germany, the workers and peasants of the GDR will win; it will be a victory of socialism over capitalism. The

erection of the economic foundations was not always easy; there were often great difficulties in the fulfillment of the plans, but achievement were accomplished which were unheard of before in Germany.

On an anniversary like this it is also necessary to thank the people who accomplished the great reconstruction work, in the first place, the people of the Soviet Union, who, through their victory over fascism, made possible the founding of the GDR, and who gave great moral and material support in many ways in the ensuing years of reconstruction.

1. The Status of the Textile Industry in 1948-1949

The Second World War inflicted great damage in Germany; in the textile industry too, many factories were destroyed. The war damage was considerable; for instance, in the three- and four-cylinder spinning mills, approximately 35 percent of all existing spinning machines were destroyed--in other words, 3.6 million spindles. The losses in wool-combing installations were likewise considerable, amounting to 27 percent of all carding machines, some 900 units.[1]

At the end of the war the workers stood before ruins and only in parts of the textile factories could production be resumed. The workers started removing the rubble; at the same time the plants belonging to the active fascists and war criminals were expropriated and taken over by the workers themselves. People-owned factories arose for the first time in German history. This period was connected with great difficulties, as the tremendous demand of the people for textiles could not be satisfied in any respect. The most difficult problem of the textile industry was the raw material supply. Great stocks were lacking. The supply of both domestic and imported fibers was insufficient. The most important raw material supplier of the textile industry was the synthetic fibers industry of the GDR, which in 1948 produced 5,522 tons of rayon and 38,545 tons of synthetic wool.[2] Synthetic fibers--not always of the best quality at that time--determined the appearance of the textile industry.

The economic plan of 1948 pointed out the difficult situation in fibrous raw materials. With the lack of fibers, considerable productive capacities, especially in the wool industry, could not be used and the danger of having to close down many plants was imminent. In 1948 we were short 14,000

tons of cotton. The productive capacities of the Saxonian textile industry could be utilized only 56 percent and those in Thuringia only 18 percent.[3]

These difficulties and many others were aggravated by the division of Germany. Disproportions of high degree arose in the textile industry.

Table 1 shows the prewar capacity of the German textile industry broken down between the GDR and the Western Zone,[4] measured by the number of employees according to plant count in 1939.

	Percentual Breakdown	
	GDR	Western Zone
Textile industry combined	48	52
Cotton spinning mills	25	75
Cotton weaving mills	21	79
Curtain material industry	95	5
Cloth printing plants	21	79
Combed wool spinners	64	36
Carding wool spinners	47	53
Silk weaving mills	12	88
Knitting mills	58	42
Hosiery mills	99	1

The uneven distribution of the various branches of the textile industry over the territory, mainly the division between yarn production and yarn usage, brought about great disproportions which hampered an even development of the textile industry in the following years.

2. The Two-Year Plan, 1949-1950

In order to overcome the existing difficulties, and in order to develop the whole national economy by plan, according to the needs of the population, the SED, with the help of the Soviet Occupation Forces, organized in 1948 the long-range plan on the basis of the democratic order newly created in 1945. The first stretch was the Six-Month Plan of 1948, followed by the 1949-1950 Two-Year Plan. This first great German economic plan had as its goal the reconstruction and development of the peace economy of the then Soviet Occupation Zone. That was a great task which demanded that the production of 1950 be raised to 81 percent of the 1936 level, which represented a 35-percent

rise in relation to the 1947 production. The textile industry had to produce 60 percent more yarns and 70 percent more fabrics in 1950 than in 1947. The synthetic fibers industry had the task of increasing the synthetic wool production by 139 percent and the rayon production by 41 percent.[5]

The industry fulfilled the Two-Year Plan in one and one-half years, thereby creating conditions for better supplying the population with consumer goods. Even so, the demands of the population could not be satisfied. The people-owned textile plants had a decisive share in the success of the Two-Year Plan, and their part in the total production of the textile industrial branch grew steadily. In the first half of 1948 their share was 32 percent, whereas in 1950 it increased to 65 percent. The people-owned textile plants were organized in 1948 in VVB's, in administrative units (Laender and Zonen). The central VVB's were subordinate to the German Economic Commission, which was responsible for the necessarily tight organization of the people-owned industries. The VVB's were independent legal organizations; they had authority to direct the plants and were obliged to keep records and accounts of their activities.[6] According to the stage of development at that time, the individual plants were severely restricted in their rights. When the GDR was founded in 1949 the tasks of the German Economic Commission were transferred to the government, which created a Ministry for the Direction of Industry. Another important event during this time was the admission of the GDR in September 1950 to the Council of Mutual Economic Aid. With this, the preconditions were created for closer economic and scientific-technical cooperation of the GDR with the Soviet Union and the European people's republics. This cooperation has had a fruitful influence on the development of the textile industry.

3. The First Five-Year Plan, 1951-1955

In July 1950 the Third Party Congress of the SED submitted to the population of the GDR the draft of the First Five-Year Plan. This draft of the First Five-Year Plan was deliberated by the population and enacted into law by the People's Chamber (Volkskammer).

This plan called on industry to double wartime production levels and to remove the productive disproportions then existing. The greatest task lay ahead of the raw materials industry, but the textile and synthetic fibers industries also had great tasks.

In the following five years the total production had to be raised 201 percent, whereas rayon production had to be raised 314 percent and synthetic wool production to 154 percent. Fabrics had to be raised to 200 percent, woolens and knitted goods 303 percent. At the same time, textile workers were required to improve the quality of their products.[7]

The solution of these problems required a wide mobilization of the working people of the textile industry, since the goals could be reached only through the increase in labor productivity, socialist competition, and rough application of new methods. Capital investments for the textile industry during the first years of the Five-Year Plan were available only to a very limited extent, since most of the capital was needed to build up the raw materials industry.

In order to achieve the plan goals, reorganization of the people-owned industries was imperative. In the beginning of 1951, a Ministry of Light Industry was founded. Subordinate to the Main Administration (HV) of Textiles were the newly formed VVB's. The VVB's of the Laender were dissolved and important large factories were subordinated directly to the Textiles HV. These measures were continued in 1952 with the introduction of accounting procedures in the people-owned plants and the formation of the VVB's. The plants were granted more rights and were also made responsible for the safeguarding and multiplication of the people's property entrusted to them. In the course of the Five-Year Plan, the administrative structure of the textile industry had been changed and was highly developed in accordance with the stage of development.

The Five-Year Plan, like the Two-Year Plan, was fulfilled and overfulfilled. These accomplishments were made possible by the noteworthy performance of the textile workers, especially that of the shock workers. In those five years the working class became the leading power of the GDR. With the change in the socio-economic position, the consciousness of the workers also changed; a new attitude toward work was manifested in the deeds of the pioneers of production. The slogan of the weaver, Frida Hockauf, "As we work today so shall we live tomorrow," became the most popular slogan of the First Five-Year Plan.[8]

Table 2

Per Capita Consumption of Important Textiles

	1950 m^2	1959 m^2	Increase (percent)
Fabrics [total]	15.72	40.68	258
Wool fabrics	0.80	2.59	314
Cotton and cotton-type fabrics	8.41	26.25	312
Underwear (pieces)	2.60	5.75	222
Carpets and runners	0.18	0.31	172
Tulle and curtains	1.24	1.81	146

4. The Second Five-Year Plan, 1956-1960

During the course of the First Five-Year Plan, the foundations of socialism were laid in the GDR. Building on that, the Third Party Congress of the SED was able to decide upon the Second Five-Year Plan with its tremendous scope. Thus, in this plan, by 1960 the total production should rise to 155 percent and the national income by 45 percent compared with 1955. The textile industry was given the task of improving the quality of production and of enlarging the assortment. In order to secure the profitableness of the enterprises, new techniques, specialization of production, and closer cooperation between the enterprises were demanded.[9]

The past three and one-half years, in which these tasks were carried out, saw considerable achievements. This is evident in the development of the rate of increase of the total production as well as in the rise in productivity in important textiles and in the improvement of quality.

It also becomes evident during the past few years that, in order to fulfill the great demands of the Five-Year Plan, the workers had to be drawn more closely into the management and direction of the enterprises and a higher quality of performance of the state agencies had to be achieved. During 1957 and 1958 decisive changes had to be made in the work of the state administration and the organizational structure of the industry. Many textile enterprises that were centrally directed until 1957 were subordinated to the local organs of the state. The Ministry of Light Industry, with its five Main Administrations for the textile industry, was dissolved. Its tasks were transferred to the newly founded VVB's and the State

Planning Commission as well as the plant managers were granted more power. The positive results of these measures soon became evident, especially in the preparations for the Fifth Party Congress, when the textile workers turned in over 60,000 single and collective pledges which brought great advantage to the national economy. The implementation of the laws for perfection and simplification of the work of the state administration contributed appreciably to the fact that the GDR, on its tenth birthday, can look back on proud achievements.

5. Results of Development of the Textile Industry

5.1 Development of Production

The most important measure of the development of the industry is the rate of growth of production. In the ten years of the GDR's existence, the total production of the textile industry increased 316 percent.

The growth rate of the individual branches of the textile industry during those years was not uniform. The branches most intensively developed were those which had the greatest significance for the removal of the disproportions and for the national economy in general.

Accordingly, the cotton spinning mills, as the most important base materials suppliers of the textile production--next to the synthetic fibers industry--were developed with priority; but other spinning mills also showed a steep rise in production. The many thousand spinning mill workers--mainly women--accomplished tremendous achievements in the plants that worked three shifts. With the development of the yarn production it became possible to increase the production of the other branches of the textile industry as well.

As a result of this rise in productivity, the per capita consumption of textiles could be decisively improved, not only in quantity but also in quality. By employing new, mainly synthetic, raw materials, it became possible to market new products such as dederon stockings and vylan underwear. With a number of products the GDR has found a prominent place in world markets.

5.2 Development of Labor Productivity

The achievements of the past few years prove that the attitude of the textile workers toward their work has changed and that their awareness has increased. Great achievements were noted in the step-up of labor productivity, resulting mainly from the following two factors:

1. The shock brigade and competitive movements
2. The development of production techniques

Since 1948 the shock brigade movement and socialist competition have grown considerably. Many pioneers in the textile industry, copying Soviet models, made tremendous strides and were awarded high medals for their exemplary performance. The many measures of the Party of the working class and of the government of the GDR in the social field contributed to the full unfolding of socialist competition and offered material incentives to the workers to raise their output. By 1950, the textile workers' wages were increased. In 1952 the salaries of technicians, engineers, and foremen were raised, and in 1952, 1953, and 1957 wage scales were again raised in some categories. A shift premium system was introduced in 1958 in the spinning mills and on 1 May 1959 a general increase in the wage scale of textile workers was granted. Through these measures and the planned growth of average wages, the textile workers' wages rose continuously during the ten-year period.[10]

Many other social measures--especially for women in the textile industry--likewise contributed extensively to the increase in labor productivity, such as the establishment of nurseries, polyclinics, vocational schools, and the introduction of the 45-hour week; they brought about a continuous improvement in the social status of the textile workers.

Great changes took place in production techniques in the textile industry, mainly in the last few years. When the GDR was founded, the textile workers inherited from capitalism old and outdated machinery. New machines were not available. In the first place, the necessary investment funds were lacking and, in the second place, the textile machine industry in the GDR, heavily damaged during the war, was not in a position to supply the textile industry with many machines--especially not high-grade ones.

The second half of the Five-Year Plan saw the beginning of the scheduled effectuation of investments aimed at changing the production techniques. However, capital investments on a large scale could be carried out only in the Second Five-Year Plan. New machines were set up mainly where the greatest production increases were desired. In the cotton spinning mills, several hundred thousand spindles, including outworks (Vorwerke) were installed. Large spinning mills were rebuilt and equipped with modern textile machines.

In the cotton weaving mills, new automatic weaving looms were installed. As a result, the rate of automation was doubled; it is now over 30 percent. For the preparation of the new synthetic silks, modern twisting frames were installed. Furthermore, a new spinning mill was set up in Floeha. In the textile finishing plants, new machines were installed. During the last few years, continuously working installations for bleaching and dyeing, film-printing machines, etc. were also set up. The production techniques were likewise modernized and changed in other branches of the textile industry. The numerous suggestions for improvements submitted by the textile workers played a great role in this work. By 1958, over 600 million DM were earmarked for the development of the textile industry.

5.3 Research and Technical Development

Another important prerequisite for a rapid increase in production was the extensive promotion by our government of research in the textile industry. This interest was manifested especially in the construction of the Research Institute for Textile Technology in Karl-Marx Stadt, for which the government contributed over 10 million DM. This institute is unique in Europe..

This great institute, with its modern facilities, was founded between 1953 and 1958. Init over 350 scientists, technicians, and textile workers work, who, in the few years since the founding of the institute, in cooperation with the textile plants, have chalked up respectable achievements in the development of textile technology and thus created a research center for the textile industry in general. Thus were completed studies for shortening the spinning processes and for the manufacture of unwoven, flat textiles. New techniques and new finishing methods for synthetic fibers were developed. This research institute, however, works not only on technological develop-

ments but also on physical, chemical, and biological research problems. Furthermore, the institute is a center for the standardization of the textile industry.

Important developmental problems are also being dealt with in twenty research and development departments which have been created during recent years. These achievements are of great importance for the growth of the textile industry in the GDR.

Besides the Research Institute for Textile Technology and the central research and development departments, another institute dealing specifically with the technology of chemical fibers was created a few years ago in Schwarza. Close relations exist between the institutes in the GDR and those of friendly countries, which is manifested in the reciprocal exchange of experiences through consultations and documentation and in the joint solution of developmental problems. Technical-scientific cooperation with the Soviet Union and the people's republics have helped the textile industry of the GDR to solve the tasks put before it.

5.4 Development of Raw Materials Supply

As previously mentioned, ten years ago the raw materials supply was the most difficult problem of the textile industry. The reason for this was that the GDR had only a very limited supply of natural fibers--in 1950 the GDR produced only 2,962 tons of wool--and the synthetic fiber industry as well as foreign trade were not in a position to supply the raw materials needed. The chief raw material was synthetic wool; it made up more than 60 percent of the fiber material structure of all textile raw materials produced.

Great changes have taken place in the raw materials supply for the textile industry. Today the situation is partly such that warehouse facilities are lacking where the available raw materials can be stored. The tremendous improvement in raw materials supply is due to the increased production of the synthetic fibers industry and the constantly rising imports of fiber materials. In addition to the increase in imports, there was also an improvement in the quality of imported fabrics. The greatest part of our raw materials imported came from the Soviet Union. During recent years, imports from capitalist countries, particulary long-fibered cotton from Egypt, have increased by leaps and bounds.

Table 3

Imports of Textile Raw Materials (in tons)

	1950	1959 (Plan)	Increase in percent
Washed wool	3,646	16,800	460
Cotton	31,702	100,000	316
Processed plant fibers	3,211	12,650	394

The improvement in the quality of the textile raw materials applies not only to the materials imported but also to the chemical fibers produced in the GDR. In the large synthetic fiber plants of Schwarza, Wolfen, and Premnitz, regenerated fibers and silks as well as synthetic fiber materials of different qualities are being produced. These fibers are being processed--wometimes in double and multiple thread mixtures--not only in the GDR but also in many countries of the socialist bloc.

Table 4

Production of Important Chemical Fibers (in tons)

	1950	1959 (Plan)	Increase in percent
Synthetic silk	9,019	26,320	192
Cellulose wool (except cellulose jute)	78,044	111,963	43
Synthetic fibers	311	7,359	2,226

5.5 Growth of Exports

Exports have a primary importance in a country poor in raw materials like the GDR. By exporting, the necessary means are created with which imports of raw materials, food, etc. can be financed. The textile industry imports a great part of its raw materials, among others all the cotton and a great deal of the wool and flax. Also imported are semi-finished and finished products. Therefore, imports have a

decisive position in textile production. The export of textiles has risen constantly during the past years. In 1950 exports amounted to 106 million rubles; they amounted to about 440 million rubles in 1958. This, however, satisfied only part of the foreign exchange requirements needed for textile imports.

The GDR exports textiles to over sixty countries. The woolens and hosiery industries have the greatest share in these exports--in 1958 over 50 million pairs of stockings and socks were exported--as well as the carpet and curtain industries. Alongside these, however, the exports of cotton, fabrics for furniture, sacking materials, fabrics for clothes, ready-made apparel, etc. played a considerable role. The export of these products has risen by leaps and bounds during the past few years, especially textiles fabricated from raw materials produced in the GDR. The reputation of our textile industry in exports is demonstrated constantly on such occasions as the Leipzig Fair, where more and more buyers, convinced of the qualitative work of our textile workers, have placed their orders.

6. Perspectives of the Textile Industry for the Seven-Year Plan 1959-1965

The aims of the textile industry during this period are high. The main economic task must be accomplished by 1961 and the Seven-Year Plan by 1965. The plan calls for a rise in total production, as compared to 1958, of 34 percent by 1961 and 91 percent by 1965. This requires an annual growth rate of 10 percent, which is possible only in a socialist country.

The assignments for the individual branches of the textile industry are tremendous. The production of three- and four-thread yarns is being raised to 162 percent. In 1965 the production will reach 150,000 tons as compared to 92,000 tons in 1958. Cotton fabrics will be increased 37 percent by 1961 and 151 percent by 1965. Carpets and runners will be raised 70 percent by 1961; knitted wear 182 percent and dederon fabrics 153 percent. The production of unwoven fabrics and other products, such as Floretta, Skelan, and Malimo, will amount to about 10 percent of the total production by 1965.

These great tasks demand great efforts. The key to the solution is socialist reconstruction. In the plants of the textile industry, reconstruction plans are being worked out. These plans give the ways and means to solve the assignments of the Seven-Year Plan concretely--namely, the introduction of new techniques, improvement of plant organization, intensification of competition, and specialization and cooperation. By 1965, the textile industry will erect two new cotton spinning mills with 100,000 spindles each. The existing spinning mills will be reconstructed and equipped largely with new machines. By 1965 about 750,000 spindles will be newly installed. In the weaving mills a great leap forward will also be made by all-around modernization and automation. By 1965 automation in the cotton weaving mills will be completed, and that in the silk weaving mills will be about 50 percent completed. By 1965, 25,000 new automatic looms will be installed in all branches of weaving. Altogether some 1.7 billion DM have been earmarked for investment, so that the tasks can be accomplished in the next seven years. It is important that these sums be utilized in the most efficient manner. The textile industry has assigned itself great tasks for the coming years and the tasks to be accomplished by the textile workers are greater and more complex than any set previously.

The achievements in the development of the textile industry of the GDR, particularly in preparation for the Fifth Party Congress of the Socialist Unity Party of Germany on the occasion of the tenth anniversary of the GDR, show the progress that the workers, foremen, engineers, and scientists in our textile industry are capable of. These successes in the peaceful struggle for the fulfillment of the plan, for better quality and higher yields of the plants, are the guarantee of the filfillment of the tasks put before the textile workers of the GDR, who are led by the Party of the working class.

Footnotes

[1]Data for the Central German Administration for Industry, Group 4310. Textiles, 1947.

[2]Statistical Yearbook of the GDR, 1955, p 166.

[3]The German Two-Year Plan of 1949-1950. Dietz Verlag, Berlin, 1948. pages 120 and 180.

[4]Cf. Textile Economics Today, Volume I of the series of the Research Institute for General and Textile Markets, University of Muenster.

[5]The German Two-Year Plan, as above.

[6]Cf. Arnold, Borchert, Schmidt: The Economics of Socialist Industry--Verlag Die Wirtschaft, Berlin, 1956, p 92.

[7]Cf. The Economics and Politics and the SED and the Government of the GDR. Dietz Verlag, Berlin 1955, p 80

[8]Ulbricht, W.: The Second Five-Year Plan and the Building of Socialism in the GDR. Dietz Verlag, Berlin, 1956, p 19.

[9]Loc. cit. pages 52 and 96.

[10]Cf. Richter, K.: "The Execution of the Wage Policies for Workers and Employees in the People-Owned Textile and Clothing Plants," Deutsche Textiltechnik [German Textile Technology], 9, (1959), No 5, pages 225-227. DTA 1053.

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Statistical Yearbook of the GDR, 1957. VEB Deutscher Zentralverlag, Berlin 1958.

4. Nursery for Children in the "Einheit" VEB Textile Mills, Glauchau.

5. Goerlitz VEB Fabric Factory. Lighting for the trimming tables.

6. Karl-Marx Stadt VEB Cotton Spinning Mill--view of the ring spinning machine hall.

7. Cunersdorf VEB Knitted Goods Factory, Werk Cranzahl--view of the Malimo department.

8. Esda VEB United Hosiery Plant, Auerbach--round knitting machine hall with Krenzler and Bentley automatic machines.

9. "Siegfried Raedel" VEB Saxon Rayon Plant, Pirna--view of the winding room for cord silk.

10. The Chairman of the USSR Council of Ministers, N. S. Khrushchev, visits the Leipzig Spring Fair as a guest of the GDR government. The picture shows him touring the circular fair house, accompanied by Otto Grotewohl, Walter Ulbricht, Dr Feldman, and experts of the textile industry.

12. Floeha VEB Fine Silk Threading Mill--view of the dederon threading room.

13. "Einheit" VEB Textile Mills, Glauchau--view of an automatic machine hall equipped with ES-II automatic cotton processing machines on which dederon is being processed.

14. Leipzig VEB Worsted Wool Mill--view of a combing hall with five assortments completed in 1950/1951.

15. Leipzig VEB Worsted Wool Mill. Extended construction of a combing hall for six assortments, capacity, 5,800 metric tons per year, to be operated starting on 1 January 1961.

16. Table model of the projected Fuerstenwalde Cord Threading Mill (presently under construction).

1954

EAST GERMANY

Successes and Tasks of Machine Builders

[This is a translation of an article by F. Zeiler in Der Maschinenbau, Vol VIII, No 10, October 1959, Berlin, pages 289-290; CSO: 3583-N/1]

The machine builders can be proud of the work they have been doing during the ten years of existence of our republic. The conditions under which they showed exemplary performance were often difficult.

Ten years ago, when the Western powers--repudiating their obligations assumed under the Potsdam Agreement--established the Western Zone state with vindictive German politicians and militarists at the head, they deepened the division of our Fatherland and thus also the disporportions in the economy. In the territory of the present GDR, we had to establish a new metallurgical basis and build up a heavy industry of our own to guarantee work to our people and ensure continuity and further development of our economy. The machine-building sector, being the manufacturer of means of production, was of special importance and had to assume great responsibility. The performance of the machine builders shows that they have recognized this and have met their obligations.

Up to 1958, gross production increased more than fourfold on the basis of 1949. The new powerful large-size units for brown coal mining, whose obsolete technology was an obstacle to our speedy development, is one of the conspicuous results. The welded bucket chain dredgers with their operational weight of 2,600 Mp [not identified], haulage performance of 2,200 cubic meters per hour, and a power absorption of 2,600 kilowatts, represent a major accomplishment of our designers, engineers, masters, and workers. With almost the same operational weight, the performance of this haulage bridge is more than double the performance of conventional bridges of this type. There are numerous achievements of this kind. Today we produce continuously-operating turning lines, rolling trains for light sections, and foil-rolling mills that meet world standards. In the same way, our light building and luffing cranes can also stand their international test. The double-decker trains with a seating place weight of 202 kp [not iden-

tified]--never attained in the past--are technical top products. To ensure the technical and material basis for the development of socialism in agriculture, equipment was constructed to relieve the rural population of some of the heavy physical labor, to overcome the backlog in the development of villages, and to help strengthen the bond between the working class and the working peasants. These achievements are emphasized by the fact that after World War II no machinery was available for the cultivation of large areas.

Today our shipyards building ocean-going vessels, which were also constructed during these years and equipped with modern facilities, supply 10,000-ton freights, railroad ferries, whaling repair ships, and sea-going passenger ships. Also well known are the successes obtained in machine-tool building, which have ensured us a leading place in the world in this extremely important industry. Great performances could also be enumerated from other sectors of machine building.

Nothing would be more unwise and detrimental to our future development of our entire economy than to be merely enthusiastic and fall back into a state of self-contentment without recognizing that conclusions can be drawn from a review of the past concerning the future policy, with its increased responsibilities for machine-building.

If we look at the problems which must be solved by our national economy under the Seven-Year Plan, we arrive at the compelling conclusion that industry and agriculture will only be able to meet their responsibilities to the extent to which the machine-building sector solves its problems in the plan. As the producer of the most important means of production, it establishes the basis for the production in all other industries. Its speed of development and technical standards, as well as the quality of its products, will determine the future development and the technical standard of production in other industries to a decisive extent. The machine-building sector also takes the main share in the total exports of the GDR (58.1 percent in 1958) and is the foremost supplier of industrial consumer goods for the requirements of the population; therefore, all those who are employed in the machine-building sector have a great responsibility.

Besides the specific responsibilities of the various sectors of machine-building under the Seven-Year Plan, we find some basic and general requirements applicable to the entire

industry. These conditions are not new, but they must always be emphasized again--particularly at the present time. In the past, insufficient compliance with them resulted in considerable difficulties in the fulfillment of the plans, particularly in meeting our export obligations. In the future, such difficulties will also arise if it is not possible to change the minds and actions of many economic officials basically within a very short time. This applies to all--from the level of intermediate management at the plants to the leading colleagues in the State Planning Commission.

The introduction of technological progress without impairment of speed--i.e., with the solution of the problem of maximum time saving--is one of the conditions which was not observed to a sufficiently great extent. They key to the solution of this problem can be found in socialist collective work with the research, development, and production sectors participating. The new cooperation which has developed in the GDR can only be thought of under socialist production conditions. Bitter competition under capitalism is replaced by friendly cooperation, exchange of experience, and mutual socialist aid. This is not confined to the plant concerned. The new operational methods become particularly efficient in the relations between several plants and industries in the common and rapid solution of problems which are of importance to the national economy.

As before, the struggle for maximum economy is of considerable importance. Economical operation requires a knowledge of cost factors. It must therefore be urged that the plan not only be divided up according to quantities and assortments but that data on cost factors also be given to the various sections, foremen, and even brigades, so that everybody will be aware of them.

Another fundamental and general requirement for the machine-building sector is the absolute observance of the planned deadlines, assortments, and quality grades. In this respect, the sins of the past are well known to every economic official and production worker at the machine-building plants; they are also aware of the frequently unbearable consequences resulting from the too frequent disregard of this requirement.

Mounting work which has been started must too often be interrupted because the supply of certain parts from the advance sections of the plant or from a cooperating plant is behind schedule and a production change is thus necessary, or stagnation and waiting periods are the result.

The detrimental practice of numerous plants of fulfilling the production plan in regard to quantity and quality but disregarding completely the fulfillment of the assortment plan, resulting from a negative attitude of leading economic officials, ends up in a similar situation. Too frequently big installations cannot be completed because supplies which are only negligible compared to the over-all project are not available on time; consequently, large export orders for high amounts cannot be filled according to schedule.

One of the numerous negative examples was found in the plan fulfillment of the VEB Sachsen Plant in Niedersedlitz. As of 30 June 1959, this plant fulfilled its gross production plan by 99.4 percent; a superficial analysis shows a deficiency of only 0.6 percent in plan fulfillment. However, if the plan fulfillment is analyzed in regard to the assortments, the situation is as follows:

The plan for refrigerants and compressors for household refrigerators was fulfilled only 21.9 percent--i.e., of the 3,500 units to be produced in the first six months according to the plan, only 768 units were completed. The situation is similar in regard to standard motors, where only 9,000 units were produced instead of 25,000 units.

For the supply of our population and our national economy, this is a shortage of 2,732 complete household refrigerators in the shops, and of 16,000 standard motors which are not available at other plants for completing important installations or for maintenance purposes.

All this has an unfavorable impact on the production and economic result of the plant and a very detrimental effect on the working morale and discipline of the workers. Moreover, domestic trade cannot meet the requirements of the population; the foreign trade sector becomes a debtor of export goods. The former undermines the confidence of the population in our planning economy, and the latter results in the loss of confidence in our trade policy on the part of our foreign trade partners. In the last analysis, every workers is affected; as an interested party, a buyer, or a consumer of industrial goods, he can see the lack of desired merchandise or the frequently inferior quality, shape, color, equipment, etc.

On the basis of the results of the trade conference which was called jointly by the Economic Commission of the Politburo of the Central Committee and the Ministry of Trade and Supplies

increased 340 percent (on the basis of 1950); on the basis of 1958 it will be increased by another 300 percent by 1965.

If the machine-builders are determined to tackle the solution of their problems in the future with the same aggressiveness as they have shown in the past few years in numerous examples, we can start the new decade of our GDR with confidence.

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"Karl Marx" Measuring Equipment and Armature Plant, Magdeburg

(This is a translation of an article by H.Pape in Der Maschinenbau, Vol.VIII,No.10,Berlin,October 1959, pp 291-292, C.S.O. 3583/N-2)

On October 7,1959 our republic celebrates its tenth anniversary. At the occasion of such a day it is appropriate to look back into the past and forward into the future. Let us thus have a look at the work and performance of the people at the socialized Measuring Equipment and Armature Plant "Karl Marx" at Magdeburg. During the capitalist era this plant was in the possession of the Schaeffer and Budenberg families. After 1945 it was continued as the Soviet Joint-Stock Company "Transmasch". On January 1,1954 it was handed over as peoples' property as a result of the generous attitude of the Soviet Union. Today it is one of the biggest and most important armature and measuring equipment manufacturers of the socialist camp.

A considerable part of the equipment is manufactured for export.

About 25 percent of our products have the quality mark "Q" or "S"; some of them have attained the absolute world standard (among others electric multi-color microwriters , high-pressure synthesis armatures, armatures with screwless cover connection) are fully recognized in the world market. The goal of the plant to manufacture about 30 percent of its products with the highest quality marks by 1965, will be attained by the application of the latest manufacturing and testing methods among which we will mention only the testing in freezing and tropical chambers and the destructionproof material testing with isotopes.

The workers of this socialized enterprise have assumed great responsibilities.

In 1936 production was 15.9 percent, in 1958 100 percent; in 1965 it will be 257.4 percent. In this tremendous produc-

tion increase it is remarkable that the number of workers will only be 99.8 percent of the 1958 level; operational productivity will rise to more than 250 percent. The operational result in 1965 will be 36fold if we take 1958 as a basis. This favorable development will be made possible by extensive reconstruction. Since the beginning of this year at numerous production meetings under the constant and good guidance of the party group at the plant discussions were held on the long-term planning of our plant and measures were adopted to attain the goals.

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Goerlitzer Machine Building Plant

(This is a translation of an article by Georg Noack in Der Maschinenbau, Vol.VIII, No.10, Berlin, October 1959, pp 293-294, C.S.O. 3583/N.-3)

From 1945 to this date, particularly during the last ten years of existence of the GDR, this plant has developed at a great speed. In the past the plant was a joint-stock company; naturally, it worked for armaments. In May 1945 a new era opened up for the people and the plant. The initial development was difficult. Empty halls, ruins and a chaos of iron parts which could not be used,etc. All this had to be removed.

On February 21,1947 the plant was transferred to thd workers as peoples' property. This ceremony took place in a poorly reconditioned room. From now onward the plant developed fast. All colleagues cooperated and were very active. Under the first Two-Year Plan the plant operated already at full speed. The new construction of turbines, diesel engines and steam engines was in the program. A stormy development began. Under the first Five-Year Plan gross production rose by 506 percent, operational productivity increased to 332 percent and the average wage climbed up to 154 percent.

More than 50 briquette presses left the plant and the first diesels thundered on the testing stands. At first oders were filled for the state and reparations had to be paid; but soon the first export orders came in from countries which were friendly toward us such as China, Poland, Egypt, India, the Soviet Union and many other countries which were interested in our products.

The fast technical development required a change of production. Development orders for gas turbines arrived. In reconstruction the production of gas turbines will come to the fore to an increasing extent, besides the steam turbines.

Undert he Seven-Year Plan the construction of twelve gas turbine installations is planned. Testing installations are already completed. In close cooperation with other plants and the GMB (_ Machine Builders Union ? _) model structures were developed and tested. In 1965 their production will pro-

bably be one third of total production. Thus the plant has the task to bring technology and operational organization up to the highest standard.

It is the goal to increase gross production by 170 percent by 1965, operational productivity to 174 percent. For reasons which are well known the number of production workers cannot be increased.

To attain the goal in spite of this, the following measures were adopted:

Within the Association of Socialized Enterprises of the industry the central building stage production is prepared through cooperation with other plants.

The application of new and productive production methods is another means of increasing operational productivity. This includes deep hole drilling, the introduction of welded structures for nozzle covers, to mention but a few.

In the administration the punched card system is introduced for ascertaining material requirements, gross wage accounting, the work of plant and operational planning groups and the responsibilities of accounting and planning control. The punch card technique increases data availability in the entire accounting organization.

The rationalization commission and the group of active reformers closely cooperate with the inventors'association to make sure that each suggestion made by a worker, is taken into consideration and put into practice immediately. The inventors' association plans to bring the saving in 1959 up to 750,000 deutsche mark by means of suggestions for improvement and engineering accounts. On the basis of 1951 this is an increase of about 600 percent.

Many colleagues and brigades were able to obtain high awards from the state in the socialist contest. Now several brigades struggle for the high title of the "Brigade of Socialist Work". Among others they have set up the goal to fulfil the Seven-Year Plan in 6 1/2 years.

1130

Radio Plant, Leipzig

(_This is a translation of an article by G.Kunze in Der Maschinenbau (Machine Building), Vol.VIII,No. 10, Berlin, October 1959, C.294-295,C.S.O.3583/N-4)

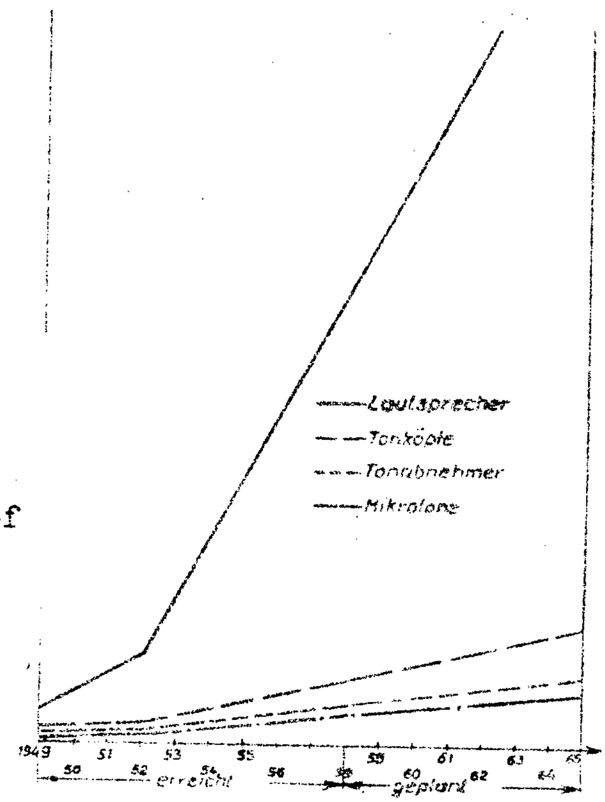
In the study of the performance achieved in the various branches of machine building the "Radio and Television" sector must also be considered. This industry which is of great importance to the population and the export scored important successes in the fulfilment of the national economy plans. Radio Plant Leipzig which is a member of the Association of Socialized Enterprises increasingly supplies the radio and television industry with transformers, loudspeakers, sound-film heads, sound pickups, microphones and sound columns. The employes of the plant were able to increase productivity within a short time and improve quality, in cooperation with the approximately 200 activists and through the application of numerous reforms. From 1950-58 the per-head performance quadrupled. Among 26 loudspeaker types 6 were given the quality mark "S" and 20 the quality mark "1". The diagram shows the continuous increase in the production of the main items. All transformers, sound heads, sound pickups and microphones carry the quality mark "1".

The successes obtained so far were made possible by a collective which grew with the responsibilities of the plant. Also in the future this collective wants to solve the problems awaiting it through common effort; it knows that,in this manner, it can obtain the greatest success in helping to further develop the national economy. This connection of the radio personnel with its work led to a reconstruction plan which, through socialist collective work, must become a great economic success of the plant on the basis of complex planning and under the Seven-Year Plan.

In this reconstruction plan productivity must triple from 1958 to 1965. This refers mainly to loudspeakers, sound heads, sound pickups and microphones. With the help of the colleagues, men and women, at the subsidiary workshops, and those working on surface treatment and mounting existing deficiencies in the operational organization, design and technology were detected and eliminated. The result are measures for improved quality, increased productivity, reduction of errors and passage periods and improved protection at work.

The application of these measures began with the standardization and specialization of the industry. The basic requirement in socialist reconstruction was the concentration of loudspeaker production in two and, lateron, in one plant. The perspective in long-term production opened up by this concentration necessitated the immediate introduction of operational measures. The standardization of structural parts which took the first place, and also included structural groups, forms the basis for an improved organization of production. This will require a positive change in cooperation with the supplying industries, for example the magnet and membrane plants. In socialist joint work above the plant level, producer and processing plants must establish the technical specifications for delivery and recognize them. The introduction of types and standards of products results in the introduction of types of technological processes. These, in turn, form the basis for the introduction of rationalized production methods. It is intended to abandon, as fast as possible, production in workshops in order to take up item series production. In the case of loudspeakers it is intended to arrive at the highest form of item series production, i.e. the assembly line. In complex planning the required technological drafting is presently elaborated together with the supplying magnet plants. Besides other advantages, the assembly line helps to reduce passage time to a minimum. To produce the loudspeaker unit provided in the reconstruction plan, the above measure will only be provisional. A partial automation of the assembly line work must be planned for this production sector. In the final stage it must be replaced by a fully automatic assembly line. For the successful solution of these problems it will be necessary to form a socialist working party which, beyond the plant level, brings together practical people, scientists, plant technicians and designers to work jointly from the first stage of development to the application of the overallplan. Under this joint effort the cooperating colleagues of the competent institutes will study the various work stages in our assembly sections; through constant discussions with our employes they will gain valuable experience for the solution of mechanical problems. With the Chair for Machinery at the Technic nical Academy at Dresden, it was agreed that, effective September 1959 holders of diplomas will start technical research on this problem. We hope this will help to find solutions as fast and exactly as possible so that the partial automation can be introduced in our assembly section. At the same time the increased output in numbers obtained through automation, requires that the presently used manual testing methods are discontinued. This means that automatic testing devices are introduced in accordance with the rhythm of the

production line. It must be possible that the testing is done automatically and,moreover, rejects are sorted out automatically. The condition for this is that the various detailed phases of the operation are examined in technological respect to such an extent that at the various statilns of the production line only a minimum of error can arise. If all agencies concerned with the solution of these problems see to it that the latest methods and findings of technology are properly applied, it will be possible during the last phase of the Seven-Year Plan to introduce such automatic testing whereever a deficient piece can no longer be processed or delivered as a finished item.



Loud Speakers

Sound Heads

Sound Pickups

Microphones

Number of Pieces

Realized

Planned

At the end of the development, structural parts which will no longer be changed, technologies developed according to the latest findings, automatic production lines and automatic testing will make it possible to obtain the increase in the number of pieces shown in the diagram prior to schedule; naturally, the planned increase in productivity must be fulfilled.

Roller Bearing Factory, Berlin

/This is a translation of an article by A.Sonnenberg in Der Maschinenbau (Machine Building), Vol.VIII, No.10,Berlin, October 1959, pp 299-301,C.S.O.3583/N.-/

"Excuse me, colleague, the lowest was mine."

The lack of space in the halls of the socialized roller bearing factory Berlin is almost catastrophal. We have never seen such tight conditions in any other plant. We can see rows of machine units and streets; it is no overstatement to say that a stout worker can only get through the passage if he walks sideways. But this is not the worst. Much more disturbing is the deafening noise of the machines operating on so little space. It is surprising how much work has been done here during the past years and,above all,how much experimenting has been going on here. The latter was done in the best meaning of the word in the interests of the workers and for the benefit of the state. This was a permanent factor of the work during the past ten years in this important enterprise of the GDR. Three figures may be quoted to supplement this statement. The number of employes increased from 40 to 1,200. Productivity rose to above 300 percent. Social and cultural performance increased from deutsche mark 1,170 in 1949 to deutsche mark 89,000 in the first half of 1959.

In 1958 approximately 5.5 million roller bearings left the plant; in 1959 it will be approximately 7.5 million. By 1965 output will increase to more than the triple number of units. On the basis of conventional techniques this would mean a triple quantity of material. It is surprising that for the triple production increase only about the double quantity of material will be required. How is this possible? In the past bars were drilled for producing outer and internal bearing rings. This technique requires a great deal of material. In the future, "pilgerd" pipes will be used; this type of pipe will result in much less waste of chips. This explains why about 7.8 million deutsche mark will be saved in spite of the higher prices for the raw material.

Progressive production management and advanced technology require progressive equipment because in the work halls mentioned above, an expansion of production units is no longer possible. Therefore, the reconstruction plan provides for a completely new appearance of the working halls.

A new production hall and a pipe storage hall will be constructed in two building stages, including the processing of turnings. This space will permit the production of about 10.5 million roller bearings according to modern aspects. Railroad cars or trucks bring the material into the pipe warehouse which is already equipped for operation; the material is unloaded with a crane-bridge. The preparatory work which, of course, is done in the same hall, must be mechanized to a great extent, i.e. roller beds connect the saws and sharpening machines with each other. In the future, heavy manual transportation will be unnecessary.

Another problem is the transportation of cuttings. At present it is still done by hand. The worker at the automatic turner must pull out the cuttings accumulating at his machine, with a long hook from the tub. This work is not easy. Then, it is a source of accidents. Workers are also required for emptying the containers with the cuttings continuously. The conventional transportation method used for the removal of the cuttings, must be made automatic. In the future, the cuttings will be led over an underground installation to be processed and brought to a collection point where they are loaded on railroad cars.

In spite of the already existing assembly line production in the work on outer and inner bearing rings, techniques are developed further continuously. So far the outer and boring diameter were turned by the DAM 4/64 automatic machine, and the first side was levelled. In the future, the process of chamfering and rounding will also be included. In subsequent treatment one turning machine can be saved (Type DAWÄ F 63) which, at the present time, must still perform this work. In regard to the formation of new assembly lines this means that investments and manpower can be saved.

The plant is still particularly concerned about the hardening shop. The appearance of the obsolete equipment (ill-minded people pretend that the equipment was taken over from medieval times) makes it evident to everybody that a production increase to 300 percent is not possible here. Heavy physical labor is the decisive factor here. After the heating the bundled rings must be lifted into the hardening bath and from there into the starting bath. A radical change is made

through the construction of a modern passage device.

The material to be hardened is put on two u-shaped grooves of heat resistant material; through a shaking movement which can be started with a regulatory gear, it is jerkwise passed through the two electrically heated shaker plate furnaces; here it is heated constantly till it reaches the hardening temperature. Over a slide with heat-resistant lining, the roller bearings are brought into the oil bath. With conveyor buckets the rings are taken from the oil bath, led over a conveyor belt into the washing machine. Sprayed over with hot alcalic lye solution the rings are brought into the hot rinsing chamber where they are sprayed off with hot water and liberated from all lye residues. From the washing machine they come to the conveyor belt of the passage starting furnace. After this phase is completed, the rings are thrown from the conveyor belt on a collecting table; they can be taken from here for further processing.

For the quality of the roller bearings both soft (turning,etc.) and hard treatment are of vital importance (grinding,etc.). Hence, the grinding shop will be equipped with automatic devices by 1965. A changeover will be made from two-machine operation to four-and six-machine operation. The attending personnel is responsible to provide these machines with rings, to change the grinding disks and to control the machines. This shows that high qualifications are required on the part of all colleagues who work with automatic machinery.

The quality control of the plant is also of interest. In the past only at the end of all operational phases a division was made into "good" and "rejected" items; today, another better way has been found, for example in the grinding shop. Besides the personal quality control made by the machine workers who are women, the controlling personnel takes out samples continuously. When deficient parts are found a signal flashes at the working place of the colleague concerned; at the same time, a luminous board indicates the deficiency. Lateron, the outer and inner rings are sorted according to dimensions; this is an intensive part of the work and requires time and manpower. The outer ring must be matched with an inner ring. In this manner only roller bearings are mounted which are ready for functioning, because deviations are always within tolerance. But the sorting must also be done automatically because, otherwise, the manpower required for this work, would have to be tripled in the course of the next few years. At present almost 100 workers are lacking in the grinding department.

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EAST GERMANY

Work of the Institute of Chemical and Refrigeration Equipment

Der Maschinenbau, Vol. VIII,
No. 12, December 1959, Berlin,
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CSO: 3488-N/a

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The chemistry program decided on by the Fifth Party Congress of the Socialist Unity Party of [E.] Germany and by our government lays down great tasks for the machine building industry, especially for plants producing chemical apparatuses. With the cooperation of all VVB's which are under the authority of the machine building sector in the State Planning Commission, it was laid down in a plan of action that the Institute of Chemical and Refrigeration Equipment be established as a center for the scientific penetration of this industry in which technical as well as economical problems of superior importance can be dealt with.

The Institute of Chemical and Refrigeration Equipment, Dresden A 1, Hamburger Strasse 28, has to solve basic technical, scientific and economic problems in the fields of equipment for the chemical, refrigeration, air conditioning and ventilation industries. Thus, it has to carry out in these fields the guidance and coordination of scientific and technical activities dealing with problems of the machine building industry as well as research of its own for the chemical, refrigeration and air conditioning equipment industries in close cooperation with the chemical industry and other industries participating in the chemistry program.

According to its statutes, the Institute is obligated to work on the solution of the following problems:
1. To carry out scientific and technical research and de-

velopment work related to the chemical and refrigeration equipment industry for the benefit of the plants of this industry;

2. to work out long-term perspective plans for the research and development work of this whole industry and to participate in working out reconstruction plans;

3. to provide scientific and technical instruction and supervision of the development, design and projection bureau of this industry by submitting and explaining modern principles of development and design, calculation methods, and so forth;

4. to carry out a continuous analysis of the technics of this field based on world standards as well as on their documentary interpretation and a directed application of certain experiences;

5. to work out and pass on modern technologies which are applied specifically and typically in this industry;

6. to collect and utilize patents in the field, carry out patent research, take out patents for innovations and inventions, and instruct and advise the industry in patent matters and suggestion systems;

7. to lay down and supervise normalization and standardization procedures to be carried out in the industry;

8. to work out technical and economical suggestions which are derived from special technical developments or from standardization and normalization, for the specialization and concentration of construction elements and standardized products of this industry;

9. to take charge of international cooperation of the machine building industry in the technical and economic field of the chemical and refrigeration equipment industry and to coordinate with other industries the problems that arise.

10. to organize and carry out lecture series and other measures for the technical and scientific training of adults and to participate in the training of the coming generation of scientists and technicians;

11. to make the results of developments available to those in charge of production;

12. to carry out a scientific investigation and test the production and performance of samples of newly developed capital goods.

With these goals in mind, the Institute has to work out the foundations for the technical policy of this industry. These consist of analyses of economic events which have to be reduced to expressive figures and diagrams to derive from them the main trends of development of the production program, technology, investment, research and other technical and economic problems. In this connection, the

Institute has also to promote cooperation with similar institutes of socialist countries which are joined together in the Council for Mutual Economic Aid.

To be able to direct the technical policy of this industry with foresight and consistency, the Institute has to keep in close contact with the consumer and accessory industries.

The main work of the Institute, however, consists of a close cooperation with the production plants of the industry. The plants have to be supported with a maximum of technical and economic help. The departments of the Institute will establish, and continuously improve, direct relations with the appropriate authorities of the production plants. The major scientific departments, for example, will advise plants on how to solve their development problems. The department of technology will work together with the technologists, master workmen and "best workers" of the plants; the department of economics, with its analyses and plant comparisons, will work out proposals for a positive development of profits and thus make a significant contribution to the future development of the industry. Further examples of this kind could be given for all departments of the Institute. It is necessary for the plants to submit their demands and wishes to the Institute in good time to make sure that they can be fulfilled. It is from such a close mutual cooperation that a socialist community must develop.

Through the Institute's participation in technical developments of our Republic, considerable success has already been achieved. By his personal efforts, the Institute's director, Professor Dr. Jungnickel, has succeeded, in the field of decomposition of gases by low temperature techniques, to make the German Democratic Republic and, moreover, a large part of the socialist camp, to a considerable extent independent of capitalist countries. In appreciation of this fact, Professor Dr. Jungnickel was awarded the National Prize on the tenth anniversary of our Republic.

Because of an export order, a liquid oxygen plant for 600 liters per hour was developed and built; several of these plants have meanwhile been exported.

This plant was developed with two goals in mind. First, to improve the inadequate supply of the industry with oxygen, and secondly, to expand our knowledge of the production, distribution and use of liquid oxygen. The advantages of liquid production lie, above all, in the economy of transportation. Therefore, efficient transport vehicles and stationary and mobile gasifiers were developed and made ready for production.

Furthermore, two large plants for the production of gaseous oxygen for the chemical and metallurgical industries are under development. Whereas one plant with a capacity of 3000 N cubic meters per hour of oxygen is already in the test stage of operation and can, in the foreseeable future, be made ready for production, the second plant, which is to produce 6000 N cubic meters per hour of oxygen, has gone through the design stage and is now under construction. The latter plant works with the modern low pressure method which makes possible a 10 per cent saving of energy, as against the combined low pressure method. The development of this plant is probably up to world standards. In addition, both plants are equipped with a Krypton-xenon plant for the production of a crude mixture containing about 50 per cent Krypton-xenon.

Work in the field of argon production was also very successful. Here it was necessary, above all, to overcome the backlog caused by the division of Germany and, on the basis of international publications, to develop something entirely new. The economic success of this project which was developed as a supplementary aggregate for already existing oxygen plants is indicated, above all, by the fact that with the first plant of this kind, by savings in foreign currency, about seven times the amount invested in the development was recovered within a year.

To meet the demands for argon to be used in welding, which have shown a marked increase in recent years, possibilities of development had to be found which would permit an economical and large-scale production of argon. As a raw material source, considerable amounts of residual gas were available which are disengaged in the particular process used in ammonia synthesis. The efforts of a collective of young members of the intelligentsia who were fully aware of the great importance of their work succeeded, within two years, in developing a major plant for the production of argon; since February 1959, considerable amounts of purified argon have been produced here. The plant has a capacity of about 300 to 350 cubic meters per hour; it is therefore capable of meeting the large demands expected in the future, especially with the discovery of new fields of application. The development of this plant can therefore be regarded as a significant contribution to the fulfillment of the economic program of our Republic; it definitely does meet world standards.

In the future, low temperature decomposition plants, developed and designed by members of the Institute, will also be used for the extraction of purified ethylene from gas mixtures.

The extracted pure ethylene is the basis of a number of organic products, especially of lubricants and, above all, of the synthetic material polythylene.

Currently, the Institute's work centers around the development of air-cooled condensers, since the general shortage of water for industrial use requires prompt measures for relieving the general water supply. The preparations for the project which was taken up only recently have already proceeded so far that the designing of a first plant can be started in the beginning of 1960. Further central projects are the development of ethylene production plants, improvement of oxygen plants with high degrees of purity and few operational requirements, Krypton-xenon production plants, the development of machines for processing plastics, and problems of filtration.

In the field of refrigeration, the refrigerator program takes first place; also, the development of absorption type refrigerating machines for major chemical industries and the beginning of the development of thermo-electric refrigeration so as to meet world standards in this field. In aeromechanics and air conditioning, the program concentrates mainly on dust extraction equipment for the chemical, metallurgical and textile industries.

Central technological problems are the installation of an assembly line in the VEB Gaselan, Fürstenwalde, the refrigerator production in the VEB DKK, Scharfenstein, and the production of wound high-pressure bodies in the VEB Germania, Karl-Marx-Stadt.

In the field of standardization, the Institute participated in arranging the educational exhibition of standardization which was opened in Leipzig in November.

The fact that the Institute is located in Dresden is very advantageous for the training of young technicians and scientists. A close cooperation with the Technical University offers valuable support for carrying out the function of the Institute. In the various departments, there are leading scientists of practically all fields who have their own special institutes, special equipment and special libraries. These great advantages can be utilized for the purposes of the Institute and thus for the entire industry.

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EAST GERMANY

Production of VEB Nema Machine Factory, Netzschkau

Der Maschinenbau, Vol. VIII,
No. 12, December 1959, Berlin,
p. 354.
CSO: 3488-N/b

H. Intemann

The VEB Nema Machine Factory, Netzschkau, is a plant of the VVB Chemical and Air Conditioning Equipment. The production program includes products for the refrigeration, heating, ventilation and air conditioning industries as well as apparatuses for the chemical industry.

During the last ten years, the plant has developed from a medium size capitalist plant into a large socialist plant with a high work productivity. With 1596 employees in 1949, there was an output of 15,490 million; by 1958, this had risen to 44.06 million with 1702 employees. Annual per capita gross production increased from 9,706 German marks in 1949 to 25,887 German marks in 1958; in 1965, there will be a gross production of 110 million German marks--an increase of about 600 per cent as against 1949. The per capita output in 1965 will be 43,800 German marks.

These tremendous production goals must be reached, and they will be reached by renovation and modernization of equipment and machinery and by investments; but in the first place through an active and responsible participation of all employees in the socialist reconstruction of the plant.

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EAST GERMANY

Cause and Effect. Critical Observations on the Work of the VVB Chemical and Air Conditioning Equipment

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O. Saussner, Berlin

The rapid development of the chemical industry has a decisive effect on the solution of the main economic problem which was decided on the Fifth Party Congress of the SED. This makes necessary an equally rapid development of the machine building industry.

The importance of the VVB Chemical and Air Conditioning Equipment is mainly based on its function of providing the chemical industry with complete chemical equipment, pilot equipment and individual equipment. In addition, the VVB is responsible for the production of air conditioning and refrigeration equipment.

In this connection, it has been laid down in the seven year plan that the plants of the VVB increase their gross production to 283 per cent, their work productivity to 231 per cent and their operational efficiency to 760 per cent, and especially the production of

Equipment for the chemical industry	to 286 per cent
Refrigeration and air conditioning equipment	to 355 per cent
Domestic refrigerators	to 695 per cent.

To achieve these goals, the industry will be allotted 20 per cent more employees in 1965 than in 1958, and 336 per cent more investment funds from 1960 to 1965 than from 1954 to 1959.

To give the chemical program a good start, it was necessary in 1959 to increase the gross production to 126.5 per cent and the work productivity to 115.2 per cent as against 1958.

Despite great efforts and good achievements on the part of some plants of our VVB, we reached our goal to fulfill the gross production plan by 80 per cent by the tenth anniversary of our republic only by 75.7 per cent. Nonfulfillment was mainly caused by three plants in which socialist principles of efficiency were flagrantly disregarded. They were the VEB's First Machine Factory Karl-Marx-Stadt, Gaselan, Fürstenwalde, and Machine Factory Sangerhausen. To name only a few causes, no concrete decisions were made as to delivery dates and persons in charge of individual projects. The achievements of modern science and technology were not sufficiently utilized. The managements of these plants failed to let the engineers, technicians and workers participate in the solution of the problems laid down in the plan.

In the plants with the largest plan deficits, the VVB, in close cooperation with the local ("Kreis") leaders of the SED, employed socialist brigades who, in collective cooperation with the plants' employees, laid down a number of measures to improve working methods. Although not all measures that were introduced will become fully effective this year, they will help to achieve a good start for the plan of 1960.

At the second chemical conference it was clearly stated that previous working methods of the machine building industry were inadequate for carrying out the chemical program.

To utilize the results of the chemical conference, the VVB held, in July, its second economic conference and laid down the goal to bring about a change in the managerial activities of the VVB and the plants. Individual shortcomings and weaknesses were criticized and it was laid down how the industry is to improve its work. The program of action which was decided upon at the conference will be the basis for the work of the VVB and the Plants in the near future. If it is rigidly adhered to, it guarantees that the necessary changes in managerial activities, introduction of recent techniques and progressive technology are carried out. Thus, the most important foundations are laid for an increase in work productivity, for socialist cooperation, competitions and participation of employees in the management of the plants. To safeguard the realization of the program of action, control measures were laid down for the plants and the VVB.

Cooperative relations in the chemical program

The most important organizational prerequisite for the production of complete and almost complete chemical equipment, and of pilot equipment, was the establishment of the VEB Complete Chemical Equipment. This is the main supplier of the machine building industry and the sole contract partner of the chemical industry.

The development of this plant was very slow, which caused delays in the carrying out of its functions. This was mainly due to the fact that the plan of action decided upon by the State Planning Commission late in 1958 was only partially fulfilled and that the decision on the definite location of the plant was delayed.

Meanwhile, a significant change developed in the work of this plant. With the active support of the Socialist Unity [that is, Communist] Party and the cooperation of several institutions, the plant will soon be able to work at full capacity.

Further delays were caused by the fact that inventory lists of the Chemistry Department of the State Planning Commission were supplied late. The loss of time is being made up by active cooperation and organizational measures of the VVB and the VEB Complete Chemistry Equipment. The plan of perspectives which is to be worked out by the VEB for the period of the seven year plan will give the leading machine building plants an official estimate of equipment to be produced by them by 1965 and thus make it possible to set up the balance sheets of their capacities.

Despite the abovementioned development the VEB Complete Chemical Equipment has been able to initiate contracts of almost one billion German marks; they will now have to be officially approved by the chemical and machine building industries.

The VEB Complete Chemical Equipment fulfills its functions in direct cooperation with the leading plants of the machine building industry. These leading plants are obligated by contract to produce and install the complete or partial equipment under their own responsibility. In the fields of measuring and regulating technics, high voltage installations and pipe line constructions, they use the services of leading cross section plants and in other fields the services of other subcontractors.

Good examples of activities of leading plants are shown, for example, by the VEB's Apparatus and Pipeline Construction Reinsdorf and Machine and Apparatus Building Grimma.

For individual projects, object collectives are formed in which representatives of the chemical industry, the VEB Complete Chemical Equipment (in charge of the project), leading plants (project engineer), the Construction and Installation Combine Halle, local authorities and social organizations are joined together. These collectives should develop into interplant socialist study groups, such as, for example, the object collective for the crude nitric acid plant in the VEB Electro-Chemical Combine Bitterfeld.

It is of the greatest importance to utilize recent changes in the work of the VEB Complete Chemical Installations and in the cooperation of the machine building and chemical industries, so as to make sure that the great problems of the chemical program are solved.

The foundation of the Institute of Chemical and Refrigeration Equipment gave this industry the urgently needed scientific center (cf. the article "Work of the Institute of Chemical and Refrigeration Equipment").

Formation of Plant Groups

To improve the cooperation among plants with similar production, four plant groups were formed within the VVB. Their importance lies, above all, in a specialization of production, increased cooperation, improvements in the managerial activities of the VVB and comparisons of plants in all their aspects. In each of these plant groups, a VVB executive was put in charge.

Socialist Reconstruction

Socialist reconstruction is one of the most important prerequisites for the fulfillment of the seven year plan. The great significance of the reconstruction of our industry can be seen from the fact that a great number of plants with various ownership status produce chemical apparatuses and equipment and that about 75 per cent of these are special designs and individual constructions. Furthermore, the plant facilities are partly out of date, since the importance of this industry has been underestimated for many years. Reconstruction plans of the plants contain, among other things, 260 suggestions for a constructive improvement of products, the establishment of four automatic machine assembly lines for the construction of refrigerators and the installation of 89 hand and machine assembly lines in plants with individual constructions or production in small and medium series.

In all foundries the conveyance of cast iron and sand is to be mechanized to a considerable extent.

The quality of the reconstruction plans that have been worked out varies considerably and meets requirements only partially. It has to be taken into account, though, that no economic surveys had been worked out in this industry. The surveys which are currently being prepared will help to improve the perspective and reconstruction plans. We are aware of the fact that this problem presents great difficulties.

It is quite evident that all economic functionaries have not yet learned to think in long periods of time. In most cases, the perspective till 1961 has been worked out relatively clearly. Beyond this, however, part of the plants have given only inadequate data, especially as to improvements of machinery. New acquisitions show a marked decrease as of 1960. Only a small part of the investments is used for raising the technical level of existing equipment. The use of machines for a modernization of welding technics and an improvement of transportation within individual plants is inadequate, considering the tasks to be fulfilled. These shortcomings are being corrected when the reconstruction plan is revised and the TOM plans are corrected. Pertinent instructions were given by the VVB and the following goals laid down:

In 1965, no more than 10 per cent of existing machinery must be older than ten years; the percentage of highly productive machinery is to be doubled; the number of forming machines is to be increased as against that of cutting machines; in accordance with a transportation analysis, manual transportation work is to be reduced by about 30 per cent and existing equipment is to be put to maximum use; by 1965, at least 60 per cent of all welding work will have to be carried out automatically.

The reconstruction measures are the basis for working out the TOM plans in the coming years. In these, such individual measures are to be laid down as guarantee the fulfillment of the proposed plans for increasing productivity and reducing costs of wages and material.

Of special importance, in this connection, is the work of the organizations dealing with suggestions and inventions. The Office of Innovators should direct such work on focal points so as to utilize better the workers' initiative. Production meetings of the unions should be made into a forum of innovators which wage a forceful fight against mismanagement and outmoded types of organization.

Work with the TOM plan has been unsatisfactory so far. Of the planned annual profit, only 53 per cent was realized by 30 September 1959, since the majority of meas-

ures are to be implemented in the fourth quarter. To improve this state of affairs, it is necessary that the leading functionaries at once cease underestimating this part of the plan. Fulfillment of the TOM plan should be regularly controlled in plant management meetings.

International Cooperation, Standardization, Specialization

Standardization and specialization are the foundations of socialist reconstruction. After all, the strength of the socialist camp is based on a far reaching, planned division of labor on an international plane.

In the Council for Mutual Economic Aid, the GDR is in charge of budgeting and specialization of chemical equipment.

In cooperation with the member countries, a proposal for the specialization of 43 products has been worked out this year in accordance with a nomenclature mutually agreed upon. The GDR will specialize in 26 groups of products; this will make it possible to achieve higher forms of production, such as assembly line production, and to make the production process much more economical. With this, the industry has pledged itself to supply our allies, within the time limit agreed upon, with high quality products which meet all demands of modern technology and to help determine the world standard of these products. A prerequisite for the solution of these problems is standardization.

Based on the standardization program, the production of containers, heat exchangers, vaporizers, column apparatuses, man-holes with lids, frames, flanges, pipe coils, rockets, bells and bubble trays, carrying claws, shafts, V-belt pulleys, and so forth, will be concentrated by 1963 in a few specialized plants.

In correct estimation of the importance of standardization the plan, in 1959, contains 95 projects to be finished as against 11 in 1958. Projects with a deadline of 30 September 1959 were completed 100 per cent with the cooperation of many members of the technical intelligentsia.

Research and Development

The demand to reach and codetermine world standards has so far been met for the following products:

Air decomposition plants, electrolysis cells for chloride of potassium, dry rotor compressors, revolving calenders for viscose dryers, automatic thrust centrifuges, high pressure ventilation for large buildings.

Although the fixation of oxygen in air decomposition plants is certainly up to world standards, the power consumption of the plant is too high, since the efficiency of the available turbo condenser and expansion machines is too low. A large number of plants still lack automatic measuring and regulating instruments for continuous operation.

Because of the scarcity of water for industrial use, it is important to develop air cooled heat exhanger of high capacity. The specific weight of refrigerating condensers will have to be considerably reduced by increasing their speed and piston speed. Such condensers with a capacity of up to 100,000 kilo calories per hour will also have to be equipped with a hermetic flange protection.

In July, the "Research and Development Plan 1960" was revised. Projects were strictly scrutinized as to their economic necessity, and a great reduction in the number of projects was made so as to reduce the great dispersal and move the deadlines up.

Competitions and Socialist Cooperation

For the solution of these great problems, socialist cooperation is of great importance. The machine builders of the VEB Chemical Machine Building Works Rudisleben, together with the chemical workers of the VEB Electro-Chemical Combine Bitterfeld announced, in the beginning of the year, a socialist competition for new and higher goals.

Within a short time, all plants of the chemical and air conditioning equipment industry and more than 100 machine building plants joined in.

All competitions have stirred up a great activity among our apparatus and machine builders. This is, for example, expressed by the fact that by 30 September 1959, 3856 suggestions for improvements were submitted which brought about a per capita savings of 390.00 German marks. Furthermore, this competition movement contributed to the fact that by 30 September 1959 the gross production at UPP was increased by 27.7 as against the same period in 1958, and the production of goods at UPP by 30 per cent. Thus, it was, for instance, possible for the Fine Zink Works Freiberg to reach the production goals.

However, it must also be admitted that weaknesses have occurred in carrying out this competition which will have to be removed in the future. One of the main shortcomings lay in the fact that not in all plants were the plans detailed enough. Good results were achieved by the VEB's Aeromechanical Equipment Berlin, Machine Factory NEMA Netzschkau and Chemical Machine Building Works Rudisleben. Such results should become more widespread, and

the specification of plans will have to be carried out consistently in all plants with the help of the competition commission of the VVB.

In spite of these shortcomings the competition movement contributed to advancing socialist cooperation. By the tenth anniversary of the GDR, 130 brigades with 1917 employees and 199 socialist study groups with 2059 employees had been formed in the plants.

So far, the socialist study groups have brought about savings of more than 2 million German marks.

In the VEB Machine Factory Nema Netzschkau, for example, the efficiency of the large ventilators for the power plants Vetschau and Lübbenau were raised, by socialist cooperation, from 74 to 82 per cent--an annual saving of 2400 kilowatts for 24 ventilators.

Another study group succeeded in reducing the time of development for thermo-baro chambers by over a year.

Especially good results can be achieved by socialist cooperation between the machine building and chemical industries, as has already been proved by a socialist study group consisting of employees of the VEB Machine Factory Halle, the Chemical Design and Engineering Bureau Leipzig and the Electro-Chemical Combine Bitterfeld in the improvement and production of electrolysis cells. A weight reduction of 25 per cent resulted in an increase of current consumption per cell from 25,000 to 50,000 amperes. Furthermore, operational safety was increased and operations were simplified.

The great tasks of the chemistry program in the seven year plan demand from employees of all branches of the machine building industry the greatest personal effort, a universal practice of socialist cooperation and an excellent and close cooperation among all branches of the machine building industry and also between the machine building and the chemical industry. Furthermore, in carrying out the resolutions of the 6th plenary session of the Central Committee of the SED and the resolution of the 5th FDGB [Freier Deutscher Gewerkschafts-Bund, E. German Trade Union Organization] Congress, the social organizations will have to promote more actively than in the past the introduction of the most modern methods and see to it that the tasks laid down are carried out.

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